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1873

Jan

PUBLIC WORKS DEPARTMENT.

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TO THE

PROCEEDINGS OF THE MADRAS GOVERNMENT,

RELATING TO IRRIGATION.

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IRRIGATION.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

PUBLIC WORKS DEPARTMENT.

For the month of January 1873.

No. 14. Read the following letter from the First Assistant Resident, Hyderabad, to the Secretary to Government, Public Works Department, For St. George, dated Hyderabad, 28th December 1872, No. 3,126 :—

I AM desired by the Resident to acknowledge the receipt of your letter No. 2,979, dated 16th December 1872, and to state that, as therein requested, due publicity will be given in the Local Gazettes of this Administration and of the Hyderabad Government to the opening afforded for labourers in connection with the irrigation works in progress in the Kistna District. The statement of the rates of labour referred to in concluding portion of above letter will be widely Published when received.

No. 15. ORDER THEREON, 4th January 1873, No. 8.

IRRIGATION, No. 1.

COMMUNICATED to the District Engineer, Kistna, in continuation of G. O. No. 2,978 of 16th December 1872.

(Signed) G. W. WALKER, Colonel, R.E.,

Secretary to Government.

No. 26. Read the following Endorsement of the Chief Engineer for Irrigation, dated Fort St. George, 11th December 1872, No. 311 :—

From the District Engineer, North Arcot, to the Chief Engineer for Irrigation, dated 10th December 1872, No. 38.

Referring to copy of letter from the Officer in charge Wallajah Range, No. 410 of 2nd December 1872, I have the honour to report that I visited the Kaveripak tank on the 7th instant. I found that four slips of the rear slope had taken place; in the worst it had breached the top breadth of the bank for a few yards; in the other cases it was entirely in the slope.

Copy of which was forwarded in No. 15 of 6th December 1872, from this office.

2. The cause of all is, I think, the extreme saturation of the bank; there are many hollows and holes on the top by which rain would largely enter the body of the bank.

3. For the present there is no cause for anxiety. Mr. Smither reports that labour is abundant and easily procured. I desired him to purchase the standing crop on some plots adjacent and to restore the slope, tamping well all that is done.

4. There is no appearance of leakage, and the tank is kept low for the present. After the threatening weather has passed we may raise the level of the water.

5. The tank requires a thorough examination, and will no doubt receive it when the season permits.

Submitted to Government in continuation of No. 308, dated 7th December 1872. The District Engineer should take care that an estimate for all work required to place this large tank in a thoroughly secure and efficient state is prepared as soon as circumstances will permit, and that the repairs are commenced in good time.

(Signed) J. MULLINS, Lieut.-Colonel, R.E.,
Chief Engineer for Irrigation.

No. 27. Order thereon, 6th January 1873, No. 14.

IRRIGATION, No. 2.

Ordered to be recorded.

2. The Chief Engineer for Irrigation will satisfy himself that his instructions for the guidance of the District Engineer are carried into effect.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

Read the following papers :—

No. 48. From the Acting Manager of the Madras Irrigation and Canal Company, to the Acting Chief Engineer for Irrigation and Joint Secretary to Government, dated Madras, 25th November 1872, No. 282.

I have the honour to inform you that the present arrangement of having a *monthly* sanction of Rupees 100 for contingencies of maintenance (see Consulting

Engineer's letters Nos. 47 and 67, dated respectively 2nd and 21st June 1871) is found in practice very inconvenient.

The total of the year's sanction, Rupees 1,200, is I believe sufficient to cover the year's expenditure, but in some months the expenditure which is necessarily variable is considerably over Rupees 100, and the Examiner of Accounts is of opinion that the monthly sanction should not be anticipated, and that all expenditure which is in excess of the current month's sanction supplemented by savings, if any, from previous months cannot be passed.

Under these circumstances, I shall be glad if the conditions of the sanction can be altered by making it Rupees 1,200 for the year instead of Rupees 100 for the month.

No. 141.

REFERRED to the Government Examiner, Madras Irrigation and Canal Company's Accounts, for his opinion.

FORT ST. GEORGE,
27th November 1872.

(Signed) C. J. SMITH, Captain, R.E.,
For *Acting Chief Engineer for Irrigation.*

No. 49. Endorsement of the Chief Engineer for Irrigation, dated Fort St. George, 4th December 1872, No. 64.

From the Examiner of Railway Accounts, Madras, to the Acting Chief Engineer for Irrigation, Fort St. George, dated 29th November 1872, No. 51.

I HAVE the honour to acknowledge the receipt of your endorsement, No. 141 of 27th instant, on letter No. 282 of 25th idem (herewith returned), from the Acting Manager, Irrigation and Canal Company, to your address, and in reply to state that I see no objection to the lump sum of Rupees 1,200 being allowed for the year, instead of Rupees 100 monthly.

SUBMITTED to Government with a recommendation that a lump sum of Rupees 1,200 for the year be sanctioned as proposed by the Acting Manager, to meet the contingencies of maintenance instead of Rupees 100 per month, sanctioned by this office under the authority conveyed in G. O. No. 973, dated 1st April 1871.

2. The expenditure incurred should be debited to Revenue.

(Signed) C. J. SMITH, Captain, R.E.,
For *Acting Chief Engineer for Irrigation.*

No. 50. ORDER THEREON, 6th January 1873, No. 25.

IRRIGATION, No. 3.

SANCTIONED as a charge against Revenue.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

No. 51. Read the following Endorsement of the Chief Engineer for Irrigation, dated Fort St. George, 10th December 1872, No. 309 :—

From the Executive Engineer No. 1 Range, Chingleput District, to the District Engineer, Chingleput, dated Camp at Ecadu, 5th December 1872, No. 685.

I HAVE the honour to report that, the floods have not yet subsided sufficiently low to allow an examination of the state of the Kesaveram Anicut Works, which, however, are, I regret to say, more seriously damaged than reported in Mr. Beeby's letter No. 265, dated 25th November, forwarded with my letter No. 652, dated 26th November 1872.

2. The head wall between the anicut and the dam at the head of the channel has been completely removed, together with the bund which it retained. The southern extremity of the anicut has been damaged a little, but the rest of the work is evidently firm. The west wing wall of the escape calingulah came down, and the body wall itself sustained some injury. Three large breaches have been formed, two on the west side of the calingulah, measuring 57 and 87 yards in length, and the one on the east, 101 yards in length. The water rushed back into the river through these gaps, and it was a fortunate circumstance it did so, as, otherwise, it would have caused great damage all along the course of the channel, the banks of which have been breached north and south in a great many places. The Trivellore Station and other important places would certainly have suffered if the channel banks had not given way.

3. The shed with all the tools* in it was completely swept away. It was erected on the north bank of the river, where the water cut a passage round the wing wall of the anicut, and returned again into the river, leaving the wing wall standing with a large gap intervening between it and the bank.

*	2 Mamooties.
	3 Pickaxes.
	2 Crowbars.
	7 Bill-hooks.
Total...	14

No. 66.

COPY forwarded to the Chief Engineer for Irrigation for information.

CHINGLEPUT, (Signed) F. J. MOBERLY, Colonel, R.E.,
9*th December* 1872. *District Engineer, Chingleput.*

SUBMITTED for the information of Government.

(Signed) J. MULLINS, Lieut.-Colonel, R.E.,
Chief Engineer for Irrigation.

No. 52. ORDER THEREON, 6th January 1873, No. 26.

IRRIGATION, No. 4.

ORDERED to be recorded.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

No. 78. Read the following papers :—

From the Acting Superintending Engineer, 1st Division, to the Acting Chief Engineer for Irrigation, dated Dowlaishweram, 27th November 1872, No. 3,070.

I HAVE the honour to forward the accompanying note just received from the Executive Engineer in charge No. 3 Range, Godavery, which is addressed to him by W. Bowden, Esq., stating that he is willing to part with his house and garden situated near the Peravelly Lock* for Rupees 800, if it be required for Government Public Works; and in so doing to bring to notice that there is no more convenient place at Peravelly than the above for erecting a rest-house, for the want of which the subordinates of the department are put to much inconvenience; and I would therefore recommend that this offer be accepted.

*On Nursapore Canal.

2. In the event of the purchase being sanctioned by Government, I request that I may be authorized to disburse the amount from the grant for the Completion Project, as the amounts allowed for rest-houses are too small to meet such a charge, and I would not have recommended it if it were not so advisable to obtain possession of this land for the Government at the head of the main line of navigation, and the charge itself for house and grounds, partly garden land, is not apparently excessive, and we may be able to save something out of materials at site. If this arrangement is disapproved of, it will be necessary to enforce the Land Act, which I would avoid in the case of houses as much as possible.

From W. BOWDEN, Senior, Esq., to the Executive Engineer, Nursapore, dated Nursapore, 23rd November 1872.

WITH reference to your letter of the 20th instant, written at the request of the Superintending Engineer, making enquiries if I wish to dispose of my house and garden which is situated near the Peravelly Lock, I beg to say that I have no wish to dispose of it, and have in contemplation to improve the house during the ensuing dry weather.

The garden is just coming into bearing.

However, if it be required for Government public works, I would part with it for Rupees eight hundred (Rupees 800.)

No. 310.

No. 78A. *Note by the Chief Engineer for Irrigation.*

THE circumstances under which the land referred to in Lieutenant-Colonel Fischer's letter went into the possession of a private individual, have been reported to Government in paragraph 12 of my memorandum, No. 62, 2nd March 1871, Proceedings Madras Government, 18th April 1871, No. 1,077.

2. A part of this land has already had to be purchased for the Peravelly Lock, and now Colonel Fischer proposes to purchase the remainder of the land and the small buildings upon it for Rupees 800, in order to make use of the site for the construction of the departmental rest-house which is to be built there.

3. I think it will be advisable to sanction this proposal, for it would have been inconvenient to have left the ground in private hands even had the price asked been somewhat in excess of its value.

4. In all cases of this kind a plan of the land to be acquired should be submitted with the application.

5. Under any circumstances the amount would have to be disbursed from the grant for the Completion Project of which the rest-houses form an item, and as,

if sanctioned, it will be an account of a rest-house, it will properly be a debit to that work, but of course the rest-house will not, including the cost of the land, have to be completed within the amount of its estimate, which did not provide for this exceptional charge.

Fort St. George, (Signed) J. MULLINS, Lieut.-Colonel, R.E.,
10*th December* 1872. *Chief Engineer for Irrigation.*

No. 79. Order thereon, 7th January 1873, No. 40.

IRRIGATION, No. 5.

Under the exceptional circumstances noticed by the Chief Engineer for Irrigation, the Government sanction the purchase from Mr. Bowden of the land and buildings near the Peravelly Lock, in the Western Delta of the Godavery, for a sum of Rupees 800, and the debit of the expenditure to the Western Delta Completion Project, now under execution from Loan Funds, against the provision for Rest-houses.

(Signed) J. MULLINS, Lieut.-Colonel, R.E.,
Joint Secretary to Government.

No. 80. Read the following endorsement of the Chief Engineer for Irrigation dated Fort St. George, 7th December 1872, No. 308 :—

From the Sub-Engineer in charge of the Wallajah Range, to the Superintending Engineer, 4th Division, dated Cauveripauk, 2nd December 1872, No. 410.

I have the honour to report, for your information, that over thirty tanks have breached in the Wallajah Taluq. Seventy-two feet of the northern calingulah of Myhendravaddy Tank has been carried away, and the south channel badly breached Cauveripauk bund has slipped in three portions, one slip bad but not dangerous. Preventive measures are being adopted. The water has now gone down three fee below high reserve level. Weather still threatening. Sholinghur Tank all right. Peroonconjee slightly breached. Poiney Anicut injured, as also Paulaur. I go there as soon as possible. Breach tanks lie in every direction. Already visited ten.

No. 51.

Copy forwarded to the Chief Engineer for Irrigation for information.

North Arcot, (Signed) F. J. MOBERLY, Colonel, R. E.,
6*th December* 1872. For *District Engineer, North Arcot.*

Submitted for the information of Government.

(Signed) J. MULLINS, Lieutenant-Colonel, R. E.,
Chief Engineer for Irrigation.

No. 81. Order thereon, 7th January 1873, No. 41.

IRRIGATION, No. 6.

Ordered to be recorded.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

No. 82. Read the following endorsement of the Officiating Chief Secretary to Government, dated 11th November 1872 :—

From the Consul General for the Netherlands Government at Singapore, to the Officiating Chief Secretary to Government, Madras, dated Singapore, 30th October 1872, No. 205.

In the absence of a Consul for the Netherlands at your port, I take the liberty to address you to obtain certain information respecting the irrigation works in the Madras Presidency, which would prove of great value to the Government of Java.

2. With a view of undertaking works of a similar description in Netherlands India, the authorities at Batavia are anxious to be possessed of some data respecting the irrigation of the Godavery and Kistna, especially in as far as the engineering and legislation is concerned.

3. The British Consul at Batavia made similar inquiries at Calcutta respecting the Mahanaddy and Soane rivers, which, however, only produced the statistics of the cultivation of rice in Bengal during the year 1867.

4. I may add that I make this application with the approval of His Excellency the Governor-General of Java, and I am desired to say that any expenses which may be incurred will be readily defrayed.

5. Trusting you will excuse the trouble I may be giving you.

Referred to the Department of Public Works, with the request that the information desired by the Batavian Government may be supplied to the Consul General for the Netherlands Government at Singapore.

(Signed) W. HUDLESTON,
Officiating Chief Secretary.

No. 83. Order thereon, 7th January 1873, No. 42.

IRRIGATION, No. 7.

Ordered that the following letter be sent.

(Signed) J. MULLINS, Lieut.-Colonel, R.E.,
Joint Secretary to Government.

No. 84. From the Secretary to the Government of Fort Saint George, Public Works Department, to the Consul General for the Netherlands Government at Singapore, dated 7th January 1872, No. 43.

IRRIGATION, No. 8.

Reports on the direct and indirect effects of the Godavery, Kistna, and the Coleroon Anicuts.
Madras Irrigation Series Nos. 1, 2, 3, and 4.
Proceedings Madras Government, No. 775, dated 14th March 1867, on Captain Mead's Report on the Cauvery.

Sir,—With reference to your letter No. 205 of the 30th October 1872, to the Chief Secretary, I have the honour by desire of His Excellency the Governor in Council to forward the papers as per margin connected with the Irrigation of the Godavery, Kistna, Coleroon, Cauvery, Pennair, and the Tambrapoorny Rivers in the Madras Presidency.

Read the following papers :—

No. 85. Endorsement of the Acting Chief Engineer for Irrigation, dated Fort St. George, 20th November 1872, No. 49.

From the Chief Engineer of the Madras Irrigation and Canal Company, to the Chief Engineer for Irrigation, dated Kurnool, 15th November 1872, No. 1.

THE Board of Directors of this Company, at a meeting held on the 1st August last, passed a resolution to the effect that they are willing, should I be prepared to undertake the management in addition to the engineering charge of the Company's affairs in India, that, while I discharge those combined duties, I should draw an additional monthly sum to the extent of one-third of the Manager's salary, making a total salary of Rupees 2,500 during the double appointment; and the Board have authorized and desired me to make application to the Madras Government for their sanction to this arrangement, whereby Rupees 1,000 per mensem would be saved as compared (they say) with existing expenditure.

2. I have the honour to request you to make the necessary application to the Madras Government for their sanction of the arrangement proposed by the Board.

3. The only remark I seem called on to add has reference to my station. The completion of the more difficult of the calingulah enlargements, the thorough examination of all the works in the dry season, and the great extension and improvement of distributing channels, will make my presence in the neighbourhood of the canal frequently necessary, and should the Government sanction the arrangement, I should be glad to have my place of residence left as free as possible. If there be no difficulty on that head, there exists, so far as my knowledge goes, no reason for declining the combined duties; and I need only add that I am willing to discharge them should the Government sanction my doing so.

From the Acting Manager of the Madras Irrigation and Canal Company, to the Acting Chief Engineer for Irrigation and Joint Secretary to Government, dated Madras, 11th November 1872, No. 271.

I HAVE the honour to inform you that I learn, by a Resolution of the Board dated 1st August 1872, which I received from the Secretary of this Company yesterday, that Mr. Latham having expressed his willingness to undertake the duties of Manager of the Company in addition to those of Chief Engineer, the Board have received the proposition favourably.

2. I have further to state that, under instructions, I have forwarded a copy of the Board's Resolution to Mr. Latham who is empowered by it to make a formal communication on the subject to the Government.

SUBMITTED for the favourable consideration of Government.

2. There can be no doubt that the duties of the Chief Engineer's appointment must, pending some settlement of the Company's affairs, gradually decrease in importance and extent while any saving in the cost of establishment consistent with efficiency is to be desired.

One letter from the Chief Engineer, Madras Irrigation and Canal Company, dated 15th November 1872, No. 1.
One letter from the Acting Manager, Madras Irrigation and Canal Company, dated 11th November 1872, No. 271.

(Signed) C. J. SMITH, Captain, R.E.,
For *Acting Chief Engineer for Irrigation.*

No. 86-87. From the Examiner of Railway Accounts.

(Here enter No. 703, dated 9th December 1872.)

No. 88. ORDER THEREON, 7th January 1873, No. 44.

IRRIGATION, No. 9.

THE arrangement proposed by the Board of the Madras Irrigation Company being in itself desirable, and the residence of the Agent of the Company out of Madras being provided for by Article 32 of the Contract between the Secretary of State and the Company, His Excellency the Governor in Council will not object to its being carried out, provided that the economy thereby effected is not otherwise decreased by extra provision having to be made for custody of records and stores and for accommodation of Office Establishments; and he desires that full report on the arrangements for these purposes involved by the change proposed may be made by the Chief Engineer for Irrigation.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

No. 96. Read the following endorsement of the Chief Engineer for Irrigation, dated Fort St. George, 2nd December 1872, No. 59:—

From the Government Examiner of Railway Accounts, to the Acting Chief Engineer for Irrigation, dated Madras, 2nd November 1872, No. 44.

I HAVE the honour to submit the following circumstances for your consideration and decision.

2. When Mr. Badham, then Chief Accountant of the Irrigation and Canal Company, some time at the end of last year examined the Pennair Division cash chest he found therein a sum less by Rupees 131-14-8 than the correct cash balance.

3. On examination of the books this deficiency was found to consist of the difference between the various balances detailed on the debit side of the accompanying statement and those on the credit side.

4. Items Nos. 1 and 5 and Rupees 14-4-0 of Item No. 3, being supported by proper vouchers, were subsequently passed, and decreased the deficiency, leaving Item No. 2, Rupees 10 in Item No. 3, Items Nos. 4, 6, and 7, aggregating Rupees 127-11-2, to be disposed of.

5. Of these items No. 2 and the Rupees 10 in No. 3, and No. 7 were clerical errors, and not adjustable in any way but by simply correcting the account by a credit of the amount. Item No. 6 was an over-payment to a contractor and irrecoverable. The remaining item No. 4 for Rupees 114-1-0 requires explanation separately.

6. This sum was the amount paid to Mr. Hutchins by Mr. Cox (since dead) as travelling allowance in advance. When the bill for this amount was forwarded to the head office, some time early in 1870, Mr. Badham saw that the amount was greater than was allowed by the Company's rules, and returned it to Mr. Higginson, who then had charge of the division, requesting him to recover the overpayment from Mr. Hutchins. Before this could be done Mr. Badham went home on leave. Mr. Higginson never made the recovery, and Mr. Hutchins left the

Company's service, and subsequently Mr. Higginson did the same, handing over charge of the division to Mr. Knorpp, the Engineer at present in charge, but, as Mr. Knorpp states, without informing him that there was any objectionable item in his cash book, credit for which had been denied by the head office.

7. When Mr. Badham returned to India this matter never recurred to him, and he imagined that the instructions issued before he left had been carried out, until he discovered this deficiency in the cash balance, when he found that no attention whatever had been paid to the matter of Mr. Hutchins' over-drawn travelling allowance.

8. The bill for this allowance was placed before me, together with a statement of the deficiency, and upon examination of it I found that only Rupees 80-9-0 was allowable under the rules, and Rupees 33-8-0 not allowable. I accordingly passed Rupees 80-9-0 to be charged off, and disallowed Rupees 33-8-0.

9. The point then arose, if this money was retrenched who was to be called upon to pay it? I then examined the various returns of the Pennair Division, and found that they were signed continuously by Mr. Knorpp after taking over from Mr. Higginson, from 22nd May 1871 to the present time, and as the balances for which he had signed could never have existed in his cash chest, I considered Mr. Knorpp clearly responsible for the deficiency, and requested that he might accordingly be called upon to pay the amount. Some correspondence seems to have ensued between Mr. Badham, now Acting Manager, the Chief Engineer, and Mr. Knorpp, and at last I received the enclosed letters* from Mr. Badham, in which it will be observed that Mr. Knorpp repudiates all responsibility on account of his signature to the returns.

* Requested to be returned.

10. The procedure to which Mr. Knorpp in his letter refers, I will now explain. Every month each Divisional Engineer sends to the head office at Madras a cash account in which he enters all moneys received from different sources, and the money he has expended, this last entry being supported by the various vouchers of expenditure. These vouchers, when received in Madras, are audited in the Chief Accountant's Office. All expenditure with insufficient vouchers is disallowed, and when all the expenditure of the month has been audited, the cash account received from the Engineer is altered in red ink showing what credits have been disallowed, and consequently how his audited cash balance will stand, and it is returned to him with a memorandum of audit. At the same time a correct account, embodying all the money received by the Engineer and the audited expenditure, and working out to the *corrected* cash balance of the division, is forwarded to the Engineer for his signature.

11. I found then that Mr. Knorpp had signed these returns each month and returned them without remark, thereby, I hold, signifying his assent to the contents. It was clearly the duty of the Executive Engineer of Divisions, on the receipt of the memorandum of audit and corrected cash balance, to have at once made the necessary corrections in his books, noting that certain items represented expenditure to which audit had been refused, and to have taken steps to correct the erroneous vouchers, and get the unaudited expenditure passed.

12. Ever since I have had the duty of examining the accounts of the Irrigation Company the utter inattention of the Engineers of Divisions to the requirements of the Manager and Audit Office, as regards accuracy of vouchers and certificates,

has been a constant source of delay and annoyance, to which I have frequently drawn attention in my former Diaries.

13. On a reference to past accounts you will see by the large sums standing at the debit of inefficient balance the effects of this carelessness and inattention on the part of Divisional Engineers.

14. I cannot but concur with Mr. Badham in considering the theory now started by Mr. Knorpp, as to his irresponsibility, as dangerous as it is novel, since little reliance can be placed on the accuracy of anything signed by an officer possessed of such ideas as to his duty to the Company. Leaving then item No. 4 out, there remains a sum of Rupees 13-10-2 on the debit side of the memorandum.

15. On the credit side of the memorandum Items Nos. 1 to 9 and No. 11 are errors in calculation, aggregating Rupees 3-14-8. Items 10, 12, and 13, aggregating Rupees 23, are amounts taken to debit in error, the divisions credited making no claim. The total credits amount to Rupees 26-14-8 and the total debits requiring adjustment (*exclusive* of the disallowed Rupees 33-8-0) amount to Rupees 13-10-2.

16. I would suggest that these sums may be placed against each other and wiped out, leaving a credit balance of Rupees 13-4-6, which I would suggest might be paid to the Company's Fine Fund, leaving the question of the Rupees 33-8-0 to be decided separately.

17. I have been obliged to enter into considerable length in describing this transaction, and trust I have laid matters before you sufficiently clearly.

Statement showing Items left unadjusted in Pennair Division.

Dr. ....Cr.

		RS. A. P.				RS. A. P.	RS. A. P.	
February 1869...	Audit No. 297...	15 11 0	1	February 1869.	Audit No. 295...	0 0 8		1
June ,, ...	Do. ,, 415...	0 0 2	2	Do. ,,	Do. ,, 296...	0 2 6		2
October ,, ...	Do. ,, 526...	24 4 0	3	April ,,	Do. ,, 345...	0 1 0		3
January 1870...	Do ,, 598...	114 1 0	4	May ,,	Do. ,, 378...	0 2 0		4
February ,, ...	Do. ,, 624...	1 3 2	5	Do. ,,	Do. ,, 383...	0 4 0		5
May ,, ...	Do. ,, 677...	3 0 0	6	June ,,	Do. ,, 422...	0 1 0		6
April 1871..	Do. ,, 842...	0 10 0	7	July ,,	Do. ,, 466..	0 10 0		7
				March 1870.	Do. ,, 631...	0 2 0		8
				May 1869.	Do. ,, 371...	2 0 0		9
				November ,,	Do. ,, 551...	18 0 0		10
				July 1870.	Do. ,, 717...	0 7 6		11
				August ,,	Do. ,, 740...	1 0 0		12
				March 1871.	Do. ,, 838...	4 0 0		13
							26 14 8	
					Difference...	......	131 14 8	
		158 13 4					158 13 4	

MADRAS,
2nd November 1872.

(Signed) C. A. MOBERLY, Captain,
Government Examiner of Railway Accounts.

From the Acting Manager of the Madras Irrigation and Canal Company, to the Examiner of Railway Accounts, dated Madras, 22nd October 1872, No. 33.

REFERRING to the discrepancies which, on the occasion of my last audit tour of the works, I discovered in the cash balance of the Pennair Division, and to your retrenchment of a sum of Rupees 33-8-0 overpaid to Mr. Hutchins, formerly an Engineer in the Company's service, I have the honour to hand you copy of a letter which Mr. Knorpp has addressed on this subject to the Chief Engineer, and which the latter officer has forwarded to me.

2. The ground which Mr. Knorpp here takes up—his repudiation of responsibility in connection with the accounts which he signs—is altogether new to me, and is as unreasonable as it is dangerous—dangerous because there is no knowing the extent to which this repudiation of responsibility may go.

3. As an interim measure I have lost no time in informing the Chief Engineer—although it is impossible that he can entertain the contrary opinion—that the Engineers *are* responsible for every official document to which they attach their signatures.

4. The correspondence which Mr. Knorpp refers to as being in this office and containing an intimation from the late Agent that his (Mr. Knorpp's) signature of the accounts involves no liability for their contents exists, so far as I am aware, only in Mr. Knorpp's imagination.

5. *I* know of no such correspondence, and as the late Agent was, as you are aware, very strong upon the point of the responsibility of Engineers, I cannot bring myself to believe that that officer ever expressed himself as Mr. Knorpp states (and I dare say believes) he did.

6. I would gladly have held Mr. Knorpp's letter over in order that that gentleman might re-consider it, but the correspondence has already dragged on for a long time, and further delay is undesirable, and as the Chief Engineer has sent me the letter without objection, it seems to come almost with the stamp of that officer's authority.

7. Moreover, Mr. Knorpp's repudiation of responsibility involves considerations of a very serious character. For years you, on behalf of the Government, have accepted the divisional documents as signed and apparently accepted by the Engineers as *vouchers* for the Company's accounts, but it now appears, if Mr. Knorpp's doctrine be accepted, that in his case at least those documents, instead of being reliable and valid vouchers, are of no more value than so much waste paper; that the signature that gentleman has attached to them was a mere form, signifying nothing, and that your audit, whenever it has resulted in an alteration in the account as rendered by Mr. Knorpp, has been entirely ignored. I need hardly say that the Company, who are desirous to carry out the provisions of the contract and to aid the views of the Government in respect of your audit in a fair and equitable spirit, are not, and will not be, parties to such a state of things as this.

8. The Company, it is true, have no special rule on this subject, but it is an obvious truism that every man is responsible for that which he puts his name to, and a rule is not necessary to make this clear.

9. I presume the Government would not be satisfied to accept the Company's accounts, even under the signature of the Company's representative, unless the documents upon which those accounts are based are reliable as vouchers, and this they cannot be if the officers who sign them ignore all responsibility and, to use Mr. Knorpp's own words, actually enter "a protest against their contents."

10. It is in this view chiefly that I place Mr. Knorpp's letter in your hands.

From C. B. KNORPP, Esq., Conservancy Engineer, to the Chief Engineer, Madras Irrigation and Canal Company, dated Iyaloor, 5th October 1872, No. 57-A.

Pennair Cash Balance.

In continuation of my former letter on this subject, and with reference to Acting Manager's Nos. 397 and 398 of 21st September, I have the honour to repeat that I have *not accepted* the Agent's balance as the correct balance of the division. I have monthly certified in the divisional cash balance sheet for such cash only as I have received, and it will be found that this does not include the sum in dispute, because it was never received by me.

2. The "corrected balance sheet," to which the Acting Manager refers in his letter, 398, I take to be the form C. prepared in the Agent's Office. This form is sent to me for signature from one, two, or three months after the time, for which it represents to be a balance of cash accounts and is duly signed by me.

3. It is probable that the Government Examiner has been misled—on seeing my signature to this form C.—to assume that I had "accepted the balance of it without remark," and I am greatly surprised that the Acting Manager has not been able to explain to him that no "liability" attaches to me on that ground, but, on the contrary, falls into the same misconception in regarding my signature of form C. as an acceptance of its contents. When the present system of accounts was introduced, I wrote to the late Agent pointing out that the forms prepared in the Agent's Office, instancing forms H II, did not agree with the Divisional records, and that therefore I could not sign them. The reply I received was in substance: that these forms, prepared in the Agent's Office, were correct; that *I must sign them departmentally, but that thereby I did not incur any liability on account of their contents.* On this condition I have signed all the forms prepared in the Agent's Office, but, as I knew from experience that they did not agree with the divisional records, I have always written an "E. E." between the totals of these forms and my signature as a protest against their contents.

4. The correspondence on this subject must be in the Acting Manager's Office, and copies of my original letters thereon will be found in the Hindry Office.

5. I trust it will be now apparent that neither "for a mere error of judgment or an oversight," as assumed by the Acting Manager, nor on account of having "neglected my duties," as assumed by the Government Examiner, do I deserve to be "visited with a pecuniary penalty."

6. In conclusion, I beg to state that I have no objection to have the last paragraph of my letter expunged, because the Acting Manager has now clearly shown that the actionable word defrauded cannot possibly apply to Mr. Higginson.

SUBMITTED to Government with a recommendation that the proposals of the Examiner of Railway Accounts for the adjustment of the items above referred to be sanctioned. With reference to the over-payment by his predecessor, the responsibility of which is repudiated by Mr. Knorpp, the Chief Engineer for Irrigation considers that that officer's views as to the degree of responsibility attaching to the signature of a document similar to that in question are quite untenable, and that the Agent and the Examiner of Railway Accounts have rightly defined Mr. Knorpp's liability. Looking, however, to the fact that the primary responsibility did not rest with Mr. Knorpp and to the lapse of time that has occurred, the Chief Engineer recommends that the charges be passed.

(Signed) C. J. SMITH, Captain, R.E.,
for *Chief Engineer for Irrigation.*

No. 97. ORDER THEREON, 8th January 1873, No. 49.

IRRIGATION, No. 10.

UNDER the circumstances stated by the Chief Engineer for Irrigation His Excellency the Governor in Council resolves to authorize the Examiner of the Madras Irrigation and Canal Company's Accounts to pass the sum of Rupees 33-8-0 which has been paid to an Engineer of the Company in excess of the amount admissible under the Travelling Allowance Rules. The credit balance of Rupees 13-4-6 in the accounts of the Pennair Division may be added to the Fine Fund as recommended by the Examiner.

2. His Excellency in Council observes that Mr. Knorpp's views are not held by the Company, neither are they admitted by Government.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

No. 113. Read the following endorsement of the Chief Engineer for Irrigation, dated Fort St. George, 4th December 1872, No. 63 :—

From the Acting Manager of the Madras Irrigation and Canal Company, to the Acting Chief Engineer for Irrigation, dated Madras, 27th November 1872, No. 285.

WITH reference to Government Order of the 13th March last, No. 695, sanctioning an advance of Rupees 50,000 for the repairs of the canal in anticipation of detailed estimates, I have the honour to forward the undermentioned estimates and document together with copy of the Chief Engineer's letter, No. 628 of the 14th instant, which accompanied them :—

One Chief Engineer's remarks on the Bill of Repairs for dry season 1872.
Two Estimates (Bills of cost).
One Abstract Estimate.

2. You will observe from the Chief Engineer's concluding paragraph that for next year's repairs that officer will submit regular estimates framed as accurately as possible while the water is in the canal, to be followed by certificates of the actual expenditure.

From the Chief Engineer, to the Acting Manager of the Madras Irrigation and Canal Company, dated Kurnool, 14th November 1872, No. 628.

Repairs for Season, 1872.

IN reference to G. O., No. 695 of 13th March last, and your reminders marginally noted, I have the honour to enclose an estimate for *last* seasons repairs for submission to Government for their approval.

Nos. 372 of 5th September, and 411 of 21st ultimo.

2. It will be apparent to Government that *some* of the work of repair admitted of estimate while water was in the canal, while some did not admit of accurate estimate until the canal was completely dry. In his anxiety to submit estimates accurate in minute detail, Mr. Browning postponed his application for sanction of funds last year to the verge of prudence, and then found himself obliged to ask for an "advance," Rupees 50,000.

3. The explanation required by Government took another month, and the sanction of the 13th March was too late to admit of all the repair which was desirable, though nothing of vital importance was omitted.

4. I hope for next year's repairs to submit regular estimates formed as accurately as possible while the water is in the canal. The certificates of expenditure will afterwards show the Consulting Engineer all that Government will further require to know.

Chief Engineer's remarks on the Bill of Repairs for dry season 1872.

THE repairs to old walls are due either to the water blowing through the crevices of the rock on which they stand, or to the mortar having been insufficiently solid in some of the courses. Nos. 6 and 7 old walls have had their foundations carried deeper where needed, and a broad footing course added of solid masonry inside the canal. Other walls have needed no more than a puddle foreshore along the inner toe, and, of course, plastering.

2. The *new* wall is inserted instead of the old puddle core walls, in preference to risking more money in their mere repair. These old walls or bank, for they have been called *dry rubble banks* also, are constructed with puddle supported in rear by open rubble work, a construction which has proved unsatisfactory in principle. There now remains only one of these walls of any importance, and I propose replacing that by masonry so soon as it needs repair.

3. In Mile 70 is a 3-arch culvert on what were thought to be durable and strong slabs of rock, exposed to a considerable rush of water under a head of 3 or 4 feet. The rock has not stood, and has probably settled, owing perhaps to dirt beds between the slabs so as to shake the masonry on the up-stream face. It seems likely enough to give more trouble yet. The whole barrel needed newly covering with concrete, and the work suffered from shortness of time.

4. The Kambalapilly sluice shutters have been replaced by good teak ones, as recommended by the Consulting Engineer.

5. The repairs in the 6th Section are such as occurred on first filling the canal either to restore actual damage, or to replace parts which, after experience, were judged too weak.

6. The lower cills of most of the locks in 8th and 9th Sections have been rebuilt, both in order to secure the cills with larger stones and to place stronger masonry below the cills. Flooring was also added, especially in Locks 13 of 8th Section and Locks 3 of 9th Section.

7. The 150th mile bank at Vaikalair aqueduct, where it crosses the old byewash, has been put into safe condition.

8. Should any further information be required I will procure it. I think all or most of the repairs in the lower sections have formed the subject of reports.

9. It will be seen that the making up of banks, after their first year's subsidence, has been almost entirely deferred.

(Signed) J. H. LATHAM,
Chief Engineer.

(„) C. A. BADHAM,
Acting Manager.

SUBMITTED to Government with reference to G. O., No. 695, of the 13th March 1872.

(Signed) C. J. SMITH, Captain, R.E.,
for *Chief Engineer for Irrigation.*

No. 114. ORDER THEREON, 8th January 1873, No. 59.

IRRIGATION, No. 11.

HIS Excellency the Governor in Council having on the representation of the Company's officers sanctioned in G. O., of 13th March 1872, No. 695, the execution of the repairs required to the canal, resolves to pass the bills, amounting to Rupees 34,700, submitted with the papers above recorded, but will expect to receive regular estimates for the repairs to be undertaken next year.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

No. 115. Read the following endorsement of the Chief Engineer for Irrigation, dated Fort St. George, 3rd December 1872, No. 62:—

From the Acting Manager of the Madras Irrigation and Canal Company, to the Acting Chief Engineer for Irrigation, dated Madras, 23rd November 1872, No. 281.

I HAVE the honour to hand you copy of a letter which I have received from the Chief Engineer with reference to the filling of the Gundipapal, Kampamulla, and Ramadoor Guntas (or tanks), and to request that you will be so good as to obtain the approval of the Government of the arrangement proposed by the Chief Engineer.

2. I enclose a copy of Mr. Chase's letter referred to by the Chief Engineer; but, as regards the agency of collection, I have no hesitation in saying that I fully agree with the Chief Engineer, and I shall feel obliged by your arranging for the rate being collected, like the other dues for water, by the Government officials.

From the Chief Engineer, to the Acting Manager of the Madras Irrigation and Canal Company, dated Kurnool, 18th November 1872, No. 636.

THE guntas of Kampamulla, Gundipapal and Ramadoor have at the villagers' request been supplied with water. These are small tanks not used for irrigation.

I enclose* Mr. Chase's letter, No. 1,048 of 14th ultimo, regarding the first of these guntas.

* Sent you with my letter of 8th instant.

I propose to have a stone fixed inside each of the guntas at a convenient height for the water when the tank is full, and that the area of the water-spread at that level be taken and called the gunta's area. I propose that for filling the guntas Rupees 6 an acre on its area be charged, and that for keeping it full it be charged at a rate of Rupees 1½ an acre a month.

2. This would be strictly 400 cubic yards a rupee for filling if the gunta averaged half a yard deep when full, and it would be strictly 400 cubic yards a rupee for keeping full if the evaporation were four or five inches a month.

3. This rate would, I think, closely agree with the facts, and would be intelligible to the villagers, and would meet the double character of their requirements.

4. I have the honour to ask you to bring the matter before Government to ask their approval, and to suggest that the rate proposed be collected with the water rate for irrigation.

From the Collector of Kurnool, to the Chief Engineer of the Madras Irrigation and Canal Company, dated Kurnool, 14th October 1872, No. 1,048.

IN reply to your letter dated 28th September 1872, No. 20, I have the honour to inform you that as you propose to supply water to the tank in the village noted in the margin, for purposes other than irrigation, that Act No. XXX. of 1865 would apply, and I would suggest before any further steps are taken that Government be applied to particularly as regard to the agency by which such water rates will have to be collected.

Kampamulla in the Koilkuntla Taluq.

2. The Kurnool Municipality pays directly to Government on account of the Company without any intermediate agency, but I fail to see how so simple a course could apply to villages distantly situated.

No. 115-A. *Note by the Chief Engineer for Irrigation.*

The extent of water involved in this reference is but small, but the convenience and benefit to the villagers from the filling of these small ponds from the Company's Canal may be considerable. As long as the provisions of Act XXX. of 1865 of the Governor-General in Council are not transgressed, the arrangements which may seem most convenient may be sanctioned. The Chief Engineer proposes that the area of the ponds, when full, be ascertained, and that Rupees 6 per acre of such area be charged for filling them, and Rupees 1½ per month for keeping them full; and he calculates, on what appear to be reasonable data, that the actual rate chargeable will then be the maximum allowed under the Act above noticed. It does not seem necessary to object to the maximum rate being charged in such cases, for the quantities of water will be small, and probably the charge will but seldom exceed four or five rupees, and will often be less.

2. As regards the agency by which collections of water charges should be made, I would suggest that the heads of villages requiring ponds to be filled should make written application to the officer in charge of the section of the canal whence the supply is to be drawn, and that this officer, after the pond has been filled, should endorse the application to that effect, and send it to the Chief Engineer for transmission to the Collector, when the latter officer would probably be able, without much trouble, to collect the amounts at the same time as other dues. Should however there be any practical difficulty in adopting this arrangement, as is hinted in the second paragraph of Mr. Chase's letter, No. 1,048 of the 14th October last, the alternative plan would be for the Canal Officer on the spot to receive payment at the time of application for the supply.

(Signed) J. MULLINS, Lieut.-Colonel, R.E.,
Chief Engineer for Irrigation.

No. 116. ORDER THEREON, 8th January 1873, No. 60.

IRRIGATION, No. 12.

The Government approve of the arrangements and terms proposed by the Chief Engineer, Madras Irrigation and Canal Company, for the supply of guntas or ponds, which are not used for irrigation, but only for village purposes, from the Company's canal.

2. The Government would wish the collection for these exceptional and non-irrigational supplies to be made by the Collector, and it is thought that by adopting the suggestion made in the early part of paragraph 2 of the Note by the Chief Engineer for Irrigation, or some similar plan, no difficulty will be experienced in levying the small sums which will from time to time fall due. On this point the Government desire to be favoured with the opinion of the Board of Revenue.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

No. 120. Read the following Endorsement of the Revenue Department, dated 4th January 1873 :—

From the Secretary to the Board of Revenue, to the Secretary to Government, Revenue Department, dated Madras, 20th December 1872, Miscellaneous No. 8,479.

WITH reference to Government Order, 13th December 1872, No. 1,675, I am directed to inquire what is meant by the term Canal Revenue.

If it refers to navigation (boat licenses, etc.,) in the Godavery and Kistna Channels, it is not under the control of the Board.

TRANSFERRED to the Public Works Department.

(Signed) D. F. CARMICHAEL,
Secretary to Government.

No. 121. ORDER THEREON, 8th January 1873, No. 63.

IRRIGATION, No. 13.

THE Government observe that the term Canal Revenue was probably used in the letter from the Government of India because irrigation in that part of India is under canals only: the expression should be taken to mean irrigation revenue, or the revenue derived from irrigation works; and, in this Presidency, such is obtained partly from canals and partly from tank irrigation.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

No. 125. Read the following letter from the Chief Engineer for Irrigation, to the Secretary to Government, Public Works Department, dated Fort St. George, 3rd December 1872, No. 61 :—

I HAVE the honour to forward letter No. 220, from the Acting Manager of the Madras Irrigation and Canal Company, enclosing three reports from the Acting Chief Engineer, explanatory of the excess expenditure on the 1st, 2nd, and 8th Sections of the canal.

2. It will be observed that the figures of the Acting Chief Engineer do not exactly coincide with those of the Acting Manager, and these slight differences, it is explained, arise partly from refunds and partly from the Acting Chief Engineer not having brought his figures down to the most recent dates.

3. The excess expenditure on the 1st and 2nd Sections being within the limit of 5 per cent. of the estimates, has been sanctioned by this office under the authority conveyed in G. O., No. 18, dated 5th January 1869, but as that on the 8th Section exceeds this limit, a statement of the net amount requiring sanction is herewith submitted to Government.

	RS.	A.	P.
Amount expended up to date	8,22,061	12	11
Amount sanctioned by Government up to date	7,80,111	0	0
Net amount requiring sanction	41,950	12	11

From the Acting Manager of the Madras Irrigation and Canal Company, to the Acting Chief Engineer for Irrigation, dated Madras, 11th September 1872, No. 220.

I HAVE the honour to hand you supplementary bills of cost of the 1st, 2nd, and 8th Sections, together with three several reports from the Acting Chief Engineer, explanatory of the excess expenditure over estimate upon those portions of the canal.

2. Unfortunately the Acting Chief Engineer in making up his statements has not brought the figures down to the most recent date, but the differences (arising partly from refunds) are comparatively trifling, and probably you will not consider it necessary, for the sake of these differences, to call for fresh statements and reports, both of which are, as you will see, very elaborate.

In the 1st Section the expenditure to date was Rupees 10,97,409-12-11, instead of Rupees 10,97,516-13-10.

In the 2nd Section Rupees 19,69,906-15-6, instead of Rupees 19,68,700.

In the 8th Section Rupees 8,22,061-12-11, instead of Rupees 8,19,021.

In the 1st Section the per-centage of excess remains unaltered, 2·2.

In the 2nd Section it is ·3 per cent., instead of ·25 (¼).

And in the 8th Section it is 5·4, instead of 4·99.

3. I trust that upon these statements and explanations you will feel yourself justified in passing the excess expenditure in accordance with G. O., No. 18, of 5th January 1869.

From the Acting Chief Engineer, to the Acting Manager of the Madras Irrigation and Canal Company, dated Kurnool, 30th August 1872, No. 506.

YOUR letter No. 336 of 12th instant.

I have the honour to forward a statement showing expenditure on the 2nd Section Works in comparison with sanction, from which it will be seen that expenditure has

exceeded sanction by	Rs.	5,330
The total sanction being	,,	19,63,370
And actual cost	,,	19,68,700 or about

¼ per cent. above sanction.

In G. O., No. 18 of 5th January, the rule is laid down that expenditure incurred on completed works within the limit of 5 per cent. of the sanctioned estimates may be passed.

The excess above stated is then only one-twentieth part of the limit allowed.

Upon most of the items the differences are so slight as to call for no remark, but I proceed to give the following explanations of the more important differences :—

(1.) The first item of importance is an excess of Rupees 1,744-12-0 on canal walls on 18th mile, which is due chiefly to raising these walls in accordance with paragraph 11 of the Consulting Engineer's letter, printed with G. O., No. 3,195 of 15th October 1867, in which Colonel Mullins says—

"I consider that either the wall should be carried up to 3½ feet above water, or to 1½ feet above the level shown in the cross sections, or that the earthwork should be carried up at least 4 feet above that level."

The former being considered the more suitable arrangement for the work, has been followed.

I will here remark that Mr. Crawford levelled the various walls on the 2nd Section requiring to be thus raised, and that they have been carried up to a level 3½ feet above water, as required.

It was expected that there would be sufficient saving on the miles to cover the small extra cost of doing this, and, therefore, no special estimate of cost was submitted.

(2.) The next item calling for remark is on the 21st mile, where there is an excess of Rupees 1,155-4-7 for earthwork.

About the beginning of 1871 it was found that the right bank of canal had settled very much, and the above excess is due to the making up of that settlement.

(3.) 26th Mile, canal wall. The excess here is due to work at the old A wall at 25 miles 79 chains, which was approved of in G. O., No. 227 of 26th January 1871, but the cost of which was not entered in any sanctioned estimate.

		RS.	A.	P.
(4.)	26th Mile, puddling excess	660	12	6
	This is owing to the omission of money due for work done from the last estimate sanctioned.			
(5.)	27th Mile, canal wall excess	685	8	0
	Due to raising walls in accordance with G. O., No. 3,195 of 15th October 1867.			
(6.)	29th Mile, earthwork excess	1,700	7	9
	This is owing to the omission from last estimate of money due to Contractor Zicheriah Khan for work done previously (in 1869).			
(7.)	30th Mile, earthwork excess	1,544	2	5
	Due to the same cause as last item.			
(8.)	31st Mile, earthwork excess	150	10	0
	Due to the same cause as last two items.			
(9)	Lastly, there is an apparent excess of	7,345	13	6
	On an item placed at the end of the statement to cover excess of expenditure on revetment and shingling over the whole 2nd Section.			

This is due to an error in arrangement in the last estimate which was sanctioned by G. O., 2,782 of 19th November 1870.

In that estimate it will be found there was an item of Rupees 13,005-15-5 inserted to cover the excess expenditure on revetment and shingling over the whole section. But on examining the estimate it will be found that Rupees 13,005-15-5 did not by any means cover the excess expenditure on revetment for there were items of excess inserted in ten out of the fifteen miles referred to.

When these items are brought out of these miles to the place they should have occupied the large difference now seen is almost entirely accounted for. The remainder of the excess is due to the incompleteness of the last estimate.

From an examination of the measurements of work on the 2nd Section it appears that the actual average cost has been by no means high.

The efficient work may be divided into three heads, namely,—

(1.) Masonry, including arch work cut-stone, centrings, etc.

(2.) Earthwork, including rock cutting and high banks.

(3.) Revetment of dry stone and shingling on the slopes of embankment.

Having checked the actual quantities of earthwork in three miles of the 2nd Section taken at random with the quantities entered as executed in the accounts of work done, I find a difference of only 1·6 or, say, 1½ per cent., due probably to settlement since the work was made.

	RS.
The actual cost of works on the 2nd Section, excluding charges for contingencies and stores, has been	16,94,876
Charges for contingencies and stores	2,73,824
Total cost of the section...	19,68,700

From this it seems that the charges for contingencies have been about 9 per cent., and the charges for stores about 7 per cent. on the actual cost of works.

The following statement may, I believe, be accepted as showing fairly the amount and value of work done on the 2nd Section :—

			RS.
138,192	cubic	yards masonry in aqueducts, bridges, walls, etc., at Rupees 3-8-0...	4,83,672
3,912,221	do.	embankment and rock cutting, at Rupees 0-4-6 ...	11,00,312
205,424	do.	revetment at Annas 12 ...	1,54,068
		Estimated present value...	17,38,052

As the actual cost of works has been Rupees 16,94,876, the prices given above are a little in excess of the actual cost, and considering the hard nature of the cuttings and great height of many of the walls and embankments, and also the fact that the price for masonry includes the cost of arch work, cut stone, etc., it must be admitted that the rates are moderate.

With the above explanations I trust the account herewith forwarded may be passed.

From the Acting Chief Engineer, to the Acting Manager of the Madras Irrigation and Canal Company, dated Kurnool, 30th August 1872, No. 507.

I HAVE the honour to forward a comparative statement showing difference between sanctioned estimate and actual cost of the 1st Section, Main Canal, from which it will be seen that the total excess of cost over sanction only amounts to 2·2 per cent. or less than half of the variation allowed by G. O., No. 18 of 5th January 1869.

The above excess is also entirely due to the cost of stores and plant. Upon works there is an actual saving on the sanctioned estimate of nearly 1 per cent.

The chief items of excess are as follow :—

(1.) Rupees 1,792-5-7 on the 2nd mile earthwork. This is entirely due to the extremely hard nature of the rock cutting.

(2.) An excess of Rupees 1,406-11-11 on No. 6 Culvert. This is due to alterations made after the breach of 1868, and is more than covered by the balance remaining on the sanction given for repairs required after the floods of 1868, see Item A., near end of the comparative statement.

(3.) 6th Mile earthworks, excess Rupees 593-15-7, due to the settlement of Yederoor Tank Bund.

(4.) 6th Mile revetment, an excess of Rupees 788-2-4 due to the raising of revetment up to top of bank to protect it from the waves formed in high winds on Yederoor Tank.

(5.) 7th Mile earthwork, an excess of Rupees 927-14-5 due to the hard nature of the rock cutting.

(6.) 10th Mile earthwork, an excess of Rupees 780-15-3 due to the settlement of embankment.

(7.) 16th Mile earthwork, an excess of Rupees 707-9-1 due to the hardness of the rock cutting.

(8.) 18th Mile masonry wall in approach to aqueduct, excess Rupees 484-1-3 due to the raising of walls in accordance with G. O., No. 3,195, of 15th October 1867.

With the above explanations which show that the variations from the sanctioned estimate are unusually slight, I trust the accounts for 1st Section, Main Canal, may now be passed.

From the Acting Chief Engineer, to the Acting Manager of the Madras Irrigation and Canal Company, dated Kurnool, 31st August 1872, No. 508.

YOUR letter No. 336 of 12th instant.

I have the honour to submit a statement showing final cost of the 8th Section, Main Canal, from which it will be seen that sanction has been exceeded by 4·99 per cent. or rather less than the limit allowed in Government Order No. 18 of 5th January 1869 :—

	RS.
The original estimate for this section of the canal was sanctioned in 1863 and amounted to	4,37,410
A revised estimate for earthwork and masonry (in which, however, the rates for masonry were unaltered) was sanctioned in 1865, giving an increase of	1,21,200
In 1866 a further sum was sanctioned (for earthwork alone) amounting to	1,78,220
In 1870 an extra bridge at Jillala and altered calingulah arrangements were sanctioned at an estimated cost of	43,281
Making the total sanction accorded up to the present time	7,80,111

From this it appears that since 1865 no revised estimate for the locks and other heavy masonry works on the division has been sanctioned, and that in the estimate of 1865 for masonry works the rates fixed in 1863 were adhered to. This is the chief cause of excess, the old estimate having been insufficient for the masonry to be built both in quantity and rate.

3. For example it showed 1,536 cubic yards of masonry in Lock No. 6, but that lock actually contains 2,360 cubic yards, and could not have been safely built with less.

4. Again, the estimate rate for masonry is Rupees 2-8-0 per cubic yard, whereas a fair average rate would have been Rupees 4-8-0.

5. There are many reasons why masonry is more costly on Koondaur Division than, for example, on Hindry Division. Amongst others the following :—

(*a.*) The distance of good quarries and beds of stone from the works. At Donapaud all the stone used had to be carted about 5 miles.

(*b.*) Lime and sand are dearer than at Kurnool.

(*c.*) The fine work required in locks which is naturally more costly than masonry in large retaining walls of simple design.

Having examined the accounts, I find the items of excess may be classified as follows :—

(1.) On Yalloor Sub-division, which was separated for a time from the rest of Koondaur Division, the excess on works alone has been Rupees 10,560, or 5·33 per cent.

(2.) On Koondaur Division proper the excess on works has been Rupees 8,599, or 2·00 per cent.

(3.) The average excess on works over the whole division, including Yalloor Sub-division, is Rupees 19,150, or 3·05 per cent.

(4.) Contingencies have cost Rupees 1,288 more than sanction, or 3·66 per cent.

(5.) Stores and plant have cost Rupees 18,470 in excess of sanction, or 15·66 per cent.

I should here note that in the accounts the cost of purchasing and transporting the lock gates and valves is included in store charges.

(6.) Including the excess on stores the average excess of cost on the whole division is as before stated 4·99 per cent.

Besides the insufficiency of the original estimate rates there is another cause of increased expenditure.

The estimate sanctioned in 1863 provided for only two bridges and five ferry boats.

Afterwards one of these ferry boats was struck out (in 1865).

In Government Order No. 1,712, of 18th July 1870, an estimate for another bridge was sanctioned at a cost of Rupees 5,700, making the total sum entered in sanctioned estimates for bridges and ferry boats Rupees 20,608, but that only provided for four boats and three bridges, or about one bridge to each ten miles of canal, which was manifestly insufficient for the requirements of the country traversed.

In Government Orders No. 3,586, of 17th November 1868, and 400 of 8th February 1871, better arrangements were agreed upon, and twelve bridges have actually been built on an average of one bridge to each 2½ miles of canal.

The total cost of bridges has been 40,442, and the sanction for bridges and ferry boats was 20,608.

Therefore the improved arrangement has entailed an extra cost of Rupees 19,834, or a little more than the total excess shown to be chargeable to works on the whole division.

The great increase in the cost of masonry was balanced by the saving effected in the construction of earthwork.

In the accounts the cost of bridges built at locks has been included with the locks at which they were built, the whole forming actually one structure.

The excess shown at Locks 7 and 14 is attributable to this arrangement, and is partly covered by the savings shown on Items A. and B., near the end of the comparative statement.

The most remarkable increase is at Lock No. 4. The original estimate for this allowed 1,536 cubic yards at a rate of Rupees 2-8-0 per yard, but the foundation of this lock was an exceedingly bad one, rendering much extra work absolutely necessary, and in fact there are 3,813 cubic yards of rubble masonry in the lock without counting arch work and cut-stone.

With the above explanations I trust the accounts will be passed by the Consulting Engineer in accordance with Government Order No. 18 of 5th January 1869.

No. 126. ORDER THEREON, 9th January 1873, No. 65.

IRRIGATION, No. 14.

UNDER the explanations furnished the excess of Rupees 41,950-12-11 over the sanctioned estimates for the 8th Section of the Company's Canal is passed.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

No. 133. Read the following Proceedings of the Government of India in the Public Works Department, (Irrigation,) dated Simla, 26th September 1872, No. 835-I :—

Irrigation on northern or left bank of Pennair, Nellore District, Sungum Project.

Read the following despatch from the Right Honourable the Secretary of State for India, (Public Works,) to His Excellency the Right Honourable the Governor-General of India in Council, dated India Office, London, 31st July 1872, No. 71.

I HAVE considered in Council the letter from your Government, dated the 22nd of April last, No. 53, submitting for approval a scheme proposed by the Government of Madras, for bestowing on the northern bank of the River Pennair, in Nellore, similar benefits to those which have been conferred on the southern portion of the delta by a carefully devised system of irrigation.

2. The project embraces the construction of a weir at Sungum, and of a large canal from the left bank of the river to fill the Kanigivi and Durur reservoirs, which will be enlarged, as well as channels from the former of these works to fill such of the minor tanks in the district as it is decided to retain.

3. It is reckoned that the scheme, which it will take five years to complete, will bring under irrigation 94,000 acres, instead of only 44,053 as at present, and the net returns are variously estimated at from 7·88 to 8·41 on the total outlay of capital.

4. As the matter is stated in your letter, the prospects of advantage from the project might warrant the ready approval of Her Majesty's Government; but there

are various points on which I desire to have further information before giving my sanction to the execution of the work.

5. In the first place the estimates do not appear to include the preliminary expenditure, nor has allowance been made for the accumulation of interest during the five years that the works are expected to be under construction, and the returns of revenue have apparently been calculated as if the whole irrigable area would at once become fully profitable on the opening of the canals. It is, moreover, questionable to what extent credit should be taken for receipts from the cultivation of waste land and the sale of the beds of abandoned tanks, until time has shown whether greater advantage may not accrue from utilising any of them as reservoirs for irrigation. On the other hand, it seems intended to allow the holders of Inam lands to irrigate their fields without any charge, although not more than three-fourths of their area has been hitherto cultivated at all, and the owners will, in all cases, gain the great advantage of freedom from apprehension of drought.

6. There is, however, a further consideration which especially leads me to pause in the matter, namely, the relations of the Government with the Madras Irrigation Company. By the terms of their original contract they are empowered to construct, under the name of the "Toombuddra Project," a system of works described in a memorandum drawn up by Sir Arthur Cotton in 1858, which contemplates, among other things, the formation of a canal through Southern Nellore, to be fed in part by water from the Pennair, taken off at Someswarum, or some other point necessarily above Sungum. By Clause 5 of their contract they are required, in planning and executing these works, to have "due regard" to "*existing* rights of irrigation," and to "*existing* interests," and also to abstain from interference with "*prospective* irrigation from channels in connexion with the Nellore Anicut, already constructed by the Madras Government." But no similar obligation is imposed with reference to prospective irrigation from channels in connexion with any works not already constructed. It becomes a question therefore, and a very serious one, whether, in the event of the Company being hereafter in a position to construct their projected works in Southern Nellore, they will not have the first claim upon all the water of the Pennair at their point of junction with that river, over and above the quantity required for the "existing rights" and "interests" and "prospective irrigation" specially referred to and reserved in Clause 5, and will not consequently be entitled, if they think fit to intercept the water reckoned upon for the supply of the works proposed by the Madras Government for the irrigation of Northern Nellore. Whether a construction so much opposed to the interests of the public must necessarily be placed on the terms of the Company's contract may perhaps be a question depending greatly on local custom and local interpretation of irrigational rights. It is one, therefore, that may be most fittingly decided by your Excellency's Government, and by that of Madras, by whom I am anxious that this, as well as the other points to which I have alluded, should be carefully considered before any further action is taken upon the project under review.

7. I shall also be glad to be informed of the circumstances connected with the application referred to in the 102nd paragraph of Mr. Smith's report of the 30th October 1869, as it is obvious that the area to which the Government have to look for early profits from the scheme of irrigation may have been considerably reduced, if land has been granted in the manner therein suggested.

ORDER.—Ordered that the above Despatch be forwarded to the Government of Madras in the Public Works Department, Irrigation Branch, in continuation of letter No. 330-I of the 22nd April last, for a complete report on all the points noted in the despatch.

(Signed) G. T. SKIPWITH, Captain, R.E.,
For *Dy. Secy. to the Government of India.*

No. 134. ORDER THEREON, 9th January 1873, No. 69.

IRRIGATION, No. 15.

IN despatch No. 71, dated 31st July 1871, from the Right Honourable the Secretary of State for India, regarding the Sungum Project for improving the irrigation on northern or left bank of Pennair river, Nellore District, the following passage occurs :—

" It seems intended to allow the holders of Inam lands to irrigate their fields without any charge, although not more than three-fourths of their area has been hitherto cultivated at all, and the owners will, in all cases, gain the great advantage of freedom from apprehension of drought."

This extract will be referred to the Revenue Department for an expression of opinion as to whether any charge could equitably be levied on the lands in question in consideration of the advantage they would surely derive from the increased quantity of water and greater regularity of supply.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

Read the following papers:—

No. 137. From Lieutenant-Colonel R. A. ROBERTS, R. E., Superintending Engineer, 8th Division, to the Secretary to Government, Public Works Department, dated Madura, 9th October 1872, No. 3,165.

IN reference to G. O. No. 2,031, dated 26th August 1872, I have the honour to report that no action has yet been taken upon the matter referred to in G. O. No. 3,555, dated 6th November 1869 ; and I think it very improbable that any action can be taken in this connection, unless an establishment is specially organized to collect and compile the information required.

2. It appears to me that this view of the question is beyond argument, inasmuch as every member of the Range establishments has already more work on his hands than he can get through properly ; and to compile the voluminous statements now required by Government would take the whole time of these establishments for a year or more.

3. With regard to the alleged delay on the part of Superintending Engineers in furnishing the Collectors " with the necessary information," I take leave to state that as the whole of the information was already on the records of the Collectors' offices, but only a part of the same in this office, the simplest plan was for the Collectors to prepare the statements and refer doubtful questions to this office. As no information was solicited by these gentlemen, none was furnished from this office.

4. With regard to paragraph 13 of G. O. dated 30th April 1872, No. 1,102, I would suggest that the Southern Range, Tinnevelly, be divided into one group for

the Tambrapoorney Irrigation, and one for the Chittaur; minor channels with their tanks and the rain-fed tanks might form two separate groups under the heads of their respective taluqs.

5. The Northern Range of the Tinnevelly District is intersected with rivers and streams of all kinds, and there ought, of course, to be a correct survey of each river, showing all dams thrown across it and each channel carried off from it. I need scarcely say, however, that in this forgotten region nothing of the kind has been done. But were such a survey made, I would then look upon each channel so carried off with all the tanks which are filled by it as a group with a regular designation, thus *Chittaur River, Pursecolum Dam and Channels, Tank* Nos. 1, 2, 3, 4, 5, and so on. All revenue from these tanks would be credited to this group, and all expenditure from new works, repairs, etc., be debited to it.

6. For rain-fed tanks they are mostly so utterly insignificant that, after the above tanks are deducted, the number remaining will not be very large, and they might all, therefore, be lumped into one item for each taluq, and be called *Sattoor rain-fed group*, for instance, and to which all receipts and expenditure would be shown as required.

7. The Madura Range naturally divides itself into three groups; one being irrigation under anicuts, the Paranay and Chittanay being the most important thereof, another that under tanks supplied from channels taken off the Vigay, and the other a group of rain-fed tanks as above explained.

8. The Dindigul Range divides itself into two sub-divisions, the Vigay basin and that of the Cauvery; the former would include the Periacolum Taluq and the southern portion of Dindigul. If still further sub-division were required, the valley of the Vigay could be divided into those of the Sooroolly and Vigay proper, while the Amravathy (including the Shunmooganuddy) would form a natural sub-division of the Cauvery drainage.

From the same Officer, dated Madura, 30th October 1872, No. 3,493.

ADVERTING to your memorandum No. 183, dated 5th September 1872, calling for a report as to progress made in the preparation of Irrigation Registers, I have the honour to report as follows:—

Four letters (in original).

2. *Madura Range.*—Registers for Fasli 1280 or 1870-71 are under preparation, and will be sent to the Collector when received from the Range Officer, Assistant Engineer Mr. Leggatt.

3. *Dindigul Range.*—Registers for 1869-70 were despatched to the Collector on the 7th November 1871. On the 16th February 1872, with letter No. 463, Assistant Engineer Mr. Lyon forwarded the Registers for 1870-71, which contained such works only as had been operated upon during that year—an arrangement made by the then Collector Mr. J. R. Arbuthnott. The present Collector has, however, pointed* out that the Registers should include all tanks, etc., above 10 cawnies, whether repaired or not, and he has requested me to furnish complete Registers. The Range Officers have been accordingly directed to prepare the Registers in question.

* Letter No. 1,274, dated 12th July 1871.

4. On the 27th May 1872 I requested the Dindigul Range Officer to expedite the despatch of the Irrigation Register for 1870-71, and Captain Pennyquick sent me the enclosed letter,†

† No. 134, dated 31st May 1872.

explaining the difficulties attending the preparation of these Registers; and to a subsequent call that officer reports‡ "that no progress has been made in this" (Dindigul) "Range towards the completion of the Irrigation Registers referred to, and I do not see any prospect of any being made." I propose addressing you further on this subject.

‡ No. 412, dated 1st October 1872.

5. *Southern Range, Tinnevelly.*—The following Registers were forwarded to the Collector on dates specified against each :—

Nangoonary Taluq	for Faslis 1278 and 1279	on the 20th July 1871.		
,,	,,	Fasli 1277 on the 10th August 1871.		
Tinnevelly	,,	,, 1279 on the 28th	,,	,,
Tenkarai	,,	,, ,, ,, ,,	,,	,,
Ambasamoodrum Taluq	,,	,, ,, 23rd Sept.		,,
Nangoonary Taluq	for Fasli 1280	on the 13th June 1872.		
Tinnevelly	,,	,, ,, 26th July		,,
Tenkarai	,,	,, ,, 26th Sept.		,,

6. Mr. Rundall reports "that draft Registers for Fasli 1281 have been prepared for all the taluqs; these have been sent" (before the 10th August) "to the Tahsildars concerned for entry therein of the Revenue details; these have not been received back from any taluq. As soon as they are received, they will be forwarded to the Sub-division Officers for the entry of the remarks regarding the state of the work * * *. I hope, if they are quickly returned by the Tahsildars, that these Registers for last year will all be completed and ready for submission * * during December."

7. *Northern Range, Tinnevelly.*—The following Registers were despatched to the Collector on the 13th June 1872.

Ootapedarum Taluq for Fasli 1278.
Sattoor Taluq for Fasli 1278.
Sunkerninarcovil Taluq for Fasli 1280.
Strivullipootoor Taluq for Fasli 1280.

Mr. McNair writes, "Irrigation Registers for the four taluqs of this range have been prepared * * for the official years from 1867-68 to 1871-72, of which the following Registers are now in the Range Office :—

Strivullipootoor Taluq for 1867-68, 1868-69, 1869-70, 1870-71, and 1871-72.
Sunkerninarcovil Taluq ,, ,, ,, ,, ,,
Sattoor Taluq for 1867-68, 1868-69, 1869-70 and 1870-71.
Ootapedarum ,, ,, ,, ,,

8. Registers for the Sattoor and Ootapedarum Taluqs have been forwarded to the Tahsildars on the 16th instant for the revenue information being entered therein.

9. Mr. McNair adds, "Of the Registers at present in the office as above, those of the four taluqs for 1867-68 are printed, the others are in manuscript, but they are all complete."

10. Registers for the under-mentioned taluqs are publish ed in the District Gazettes on dates noted opposite to each taluq in the Madura and Tinnevelly Districts, namely :—

Madura District,	Madura Taluq,	for Fasli 1277	on the	13th May 1871.
,,	Pareacolum Taluq	,, ,,	,,	2nd Sept. ,,
,,	Melur Taluq	,, ,,	,,	30th ,, ,,
,,	Ramnad Zemindary	for Fasli 1277	on the	17th Aug. 1872.
,,	,,	,, 1278	,,	14th Sept. ,,
Tinnevelly District,	Nangoonary Taluq,	,, 1277	,,	4th Nov. 1871.
,,	Tinnevelly	,, ,,	,,	3rd Feb. 1872.
,,	Tenkarai	,, ,,	,,	2nd March ,,
,,	Ambasamoodrum Taluq,	for Fasli 1279.		

11. I beg to enclose the under-mentioned correspondence, in original, for your perusal and obliging return to this office, when no longer required by you.

Letter from the Collector of Madura, No. 1,274, dated 12th July 1871.
,, to ,, ,, ,, 2,822, ,, 7th Nov. ,,
Letter from Assistant Engineer Mr. Lyon, No. 463, dated 16th Feb. 1872.
,, ,, Captain Pennycuick, R. E., ,, 134, ,, 31st May ,,

From the Acting Collector of Madura, to the Acting Superintending Engineer, 8th Division, dated Periacolum, 12th July 1871, No. 1,274.

With reference to your letter No. 1,059, dated 29th June, I have the honour to inform you that under the Circular Order of the Board No. III. of 1869 numbers have been assigned to each irrigation work in the taluqs which should never be altered, and therefore the order in which the works are now entered cannot be altered in order to arrange them alphabetically.

2. I take this opportunity to invite your attention to the correspondence noted in the margin, from which you will observe that the Irrigation Registers should show the condition of all works whether repaired or not, whereas a few of them only which are repaired yearly find a place in the Registers received from your department.

1. From the Executive Engineer in charge of Superintending Engineer's Office, 8th Division, dated 13th October 1868, No. 1,565.
2. To the Officiating Superintending Engineer, dated 21st January 1869, No. 97.
3. To do., dated 17th December 1869, No. 2,065.
4. From Do., dated 7th January 1870, No 2,302.
5. Board's Proceedings, dated 19th February 1870, No. 1,159.
6. To the Officiating Superintending Engineer, dated 5th March 1870, No. 385.
7. From do., dated 15th March 1870, No. 2,921.

3. As requested in my letter No. 580 of the 29th March last, I request you will be good enough to expedite the transmission of the Irrigation Registers of the Dindigul, Pulney, and Periacolum Taluqs for 1869-70.

4. I further request you will instruct the Range Officers not to include in their Registers tanks, etc., below 10 cawnies.

No. 2,424.

Copy forwarded to the Assistant Engineer in charge of the Madura Range and the Overseer in charge of the Dindigul Range for information and guidance, in continuation of memorandum from this Office No. 2,945, dated 19th March 1870.

2. Serjeant Hamilton should lose no further time in forwarding the Irrigation Registers for the Dindigul, Pulney, and Periacolum Taluqs for the year 1869-70.

Shermadevi,
3rd October 1871.

(Signed) R. A. ROBERTS, Lieut.-Colonel, R.E.,
Acting Superintending Engineer, 8th Division.

From the Superintending Engineer, 8th Division, to the Collector of Madura, dated 7th November 1872, No. 2,882.

As requested in your letter No. 1,666, dated 9th September 1871, I have the honour to forward herewith the Irrigation Registers of the Dindigul and Pulni Taluqs for the year 1869-70, and to state that the Registers contain only such works as have been operated upon during that year, as proposed* by the late Officiating Superintending Engineer Captain Prendergast, R.E., and approved† of by the then Officiating Collector Mr. J. R. Arbuthnott.

Two Irrigation Registers.

* Letter No. 1,565, dated 13th October 1868.
† Letter ,, 97, ,, 21st January 1869.

2. The Register for the Periacolum Taluq for the above-mentioned year has been returned to the Range Officer for the filling in of certain information which had been omitted, and it will be despatched to you so soon as it is received back in this office.

3. I may mention that the Irrigation Registers for subsequent years will be prepared, including the names of *all* works in the several taluqs, showing their condition, whether repaired or not, as laid down in the correspondence quoted in paragraph 2 of your letter No. 1,274, dated 12th July 1871.

No. 2,883.

COPY forwarded to the Assistant Engineers in charge of the Madura and Dindigul Ranges for information and guidance in continuation of memorandum from this office No. 2,424, dated 3rd October 1871, on the subject of preparation of Irrigation Registers.

2. Mr. Leggatt and Mr. Lyon are requested to hasten as much as possible the despatch of the Irrigation Registers for 1870-71.

MADURA, (Signed) R. A. ROBERTS, Lieut.-Colonel, R.E.,
3rd November 1871. *Superintending Engineer, 8th Division.*

From H. LYON, Esq., Assistant Engineer in charge of 2nd Range, to the Superintending Engineer, 8th Division, dated Boodinaikanoor, 16th February 1872, No. 463.

I HAVE the honour to forward the Irrigation Registers for 1870-71 of the three taluqs in this Range.

2. In paragraph 3 of your letter No. 2,882 of 7th November 1871, addressed to the Collector and communicated to me in your memorandum No. 2,883 of 7th November 1871, you state that "the Irrigation Registers for the subsequent years will be prepared, including the names of *all* works in the several taluqs showing their condition, whether repaired or not as laid down in the correspondence quoted in paragraph 3 of your letter No. 1,274, dated 12th July 1871," but the Registers now forwarded include only those works upon which repairs have been executed.

3. As in the published Irrigation Registers all works with their condition are given, it will be evident that all those that do not appear in the enclosed Registers were not repaired during 1870-71.

4. I need scarcely inform you that the preparation of an Irrigation Register for *all* the works in each taluq would occupy a considerable portion of valuable time, and while Registers have already been published, I would beg to submit that the information really useful and necessary relates only to those works upon which repairs have been executed.

5. As you have more than once called for these Registers, I have taken this opportunity of submitting them as have received them rather than delay for the two or three months, which would be necessary to send a complete Register.

From Captain J. PENNYCUICK, R. E., Executive Engineer in charge of Dindigul Range, to the Superintending Engineer, 8th Division, dated Kasavaputty, 31st May 1872, No. 134.

WITH reference to your memorandum No. 835 of 27th instant, I have the honour to observe that information for compiling the Registers required has to be obtained by the Taluq Overseers from the Tahsildars.

2. The returns from any one taluq have not yet been received in this office, and when they do come in they will have to be compiled and copied—a work which will take some time, with the ridiculously insufficient establishment which the Range Office has.

3. I must say that the constant succession of "Returns" and "Statements" which are now being called for is rapidly becoming (or perhaps I should rather say has become) a very serious obstacle to the proper conduct of executive work.

4. Every day some new form, or some addition to an old one, is asked for, but I do not hear of any proposals to increase the office establishments.

5. This office has already more on its hands than it can get through, and in a very little while, at the present rate, our whole time will be taken up in the preparation of "Returns," leaving us none whatever for executive work or current correspondence.

From the Superintending Engineer, 8th Division, to the Acting Chief Engineer for Irrigation, dated Madura, 12th November 1872, No. 3,748.

In reference to paragraph 4 of my letter No. 3,493, dated 30th October 1872, I have the honour to inform you that the Dindigul Range Officer has reported that he will require a Writer of Rupees 40 per mensem for six months to enable him to complete the Irrigation Registers of his Range for the years 1870-71 and 1871-72; and to request therefore that you will be so good as to obtain the early orders of Government for the entertainment of a Writer as requested by Captain Pennycuick, R.E.

No. 289.

No. 138. *Note by the Acting Chief Engineer for Irrigation.*

In letter No. 3,165 of 9th October the Superintending Engineer of the 8th Division reports that no action has been taken on G. O. No. 3,555 of 6th November 1869, relative to the preparation of statements affording accurate information as to the remunerative character of expenditure in India on irrigation works and called for by the Secretary of State for India.

2. The first step towards the preparation of the statements required is the preparation of Irrigation Registers, and the progress made with regard to these is given in letter No. 3,493 of 30th October 1872. It would appear, however, that in the preparation of these Registers the natural order of things is being reversed in the 8th Division. The Registers, it appears, are being prepared by the Range Officers, and when prepared are sent to the Collector. The information required to prepare the Registers must, in the first instance, be obtained from the Revenue Department; hence the Revenue Department should prepare the Registers and send them to the Department of Public Works to have certain columns filled in by that department, but the original Registers should not be prepared by the Public Works Department.

3. The Registers for one year for each of the taluqs appear to have been prepared, hence the preparation of future Registers ought to be a comparatively simple matter, the names of all the works having been once obtained, blank forms showing all the works should be struck off, and these should be sent to the Range Officers in order that the expenditure incurred in subsequent years may be entered in the form as early as possible after the close of the official year, and be forwarded to the Collector, columns 10 and 11 being filled in for all the works repaired, and for as many others as the Range Officer or his subordinates may have had an opportunity of examining, as a rule but slight modifications of the original entries in column 10 would have to be made, and the complete revision year by year of those entries for every work, whether repaired or not, would be unnecessary.

4. It would appear that manuscript copies of the Registers have now to be prepared by the Executive Engineers, and the Collector of Madura requests that all works, whether repaired, etc., or not, may be included in the Registers; this, of course, throws a great deal of labour on the Range Offices, which is entirely unnecessary.

5. Were blank forms of the Registers sent to the Range Officers the entries in the Registers might be filled up month by month as works were completed, and the entire Register completed within six weeks of the termination of the official year. The entries of assessment, etc., having been filled in, in the Collector's Office, the entries in column 9 would be computed in that office.

6. In letter No. 3,748, dated 12th November 1872, Colonel Roberts applies for a Writer for six months on a salary of Rupees 40 to complete the registers in the Dindigul Range. In No. 3,165 he applies for a special establishment to collect and compile the information required to prepare the statement called for by the Secretary of State. So far as the information required consists in the preparation of the Registers, very trifling aid, if any, would be required in the Superintending Engineer's Office now that one Irrigation Statement has been prepared, if blank forms are printed but if manuscript copies are prepared annually of all the works, and columns 10 and 11 of the Register are to be filled in year by year for all works by the Range Officer, as the Collector of Madura appears to desire, a permanent addition must be made to the office establishment of each Range. At present I would suggest the sanction of the entertainment of a Writer in the Dindigul Range or in the Superintending Engineer's Office for a period of six months; the mere entry in the blank Register of expenditure could probably be made in the latter office from the Progress Reports.

7. In paragraph 4 of No. 3,165 Colonel Roberts makes his suggestions relative to the grouping of the works in the Tinnevelly District. He would divide the Southern Range as follows:—

1. Tambrapoorney Irrigation.
2. Chittaur.
3. Minor channels with their tanks, and
4. Rain-fed tanks.

8. This classification appears to be judicious, it being understood that the irrigation under the rivers Tambrapoorney and Chittaur includes that under all channels and tanks supplied by those rivers, and hence that no channels from those rivers are included under No. 3. The Tambrapoorney should, however, be divided into two groups, the one comprising the Streevigoontum anicut and its subsidiary works, and the other the irrigation independent of that anicut.

9. In the absence of surveys of the rivers in the Northern Range, the Superintending Engineer does not state the groups into which he would divide that Range, but suggests how the Range might be divided into groups, namely, that all cultivation under each stream, whether dependent upon channels or tanks supplied from the main stream, should be regarded as a group, even in the absence of surveys of the rivers. With one Irrigation Register complete the village authorities would have no difficulty in marking the works appertaining to each main stream or group, and hence the grouping might be commenced at once. Main streams and the subsidiary works which distribute the water from them and the tanks which receive the water being grouped separately, minor streams and their tanks forming a separate group and rain-fed tanks forming a group by themselves.

10. In the Madura District the irrigation under the Vigay might form a group with that under its tributaries forming sub-groups. The Cauvery valley might form a second group, minor streams and tanks supplied by them, a third, and rain-fed tanks, a fourth.

11. It does not appear whether the Collectors have been consulted relative to the grouping proposed, or whether that grouping has been considered or classified with reference to the knowledge extant relative to the outlay on the original works; if these points have been satisfied the grouping as given above may be approved, and the information required to admit of the financial statements being prepared should be collected and compiled as early as possible.

FORT ST. GEORGE, (Signed) R. F. OAKES, Major, R.E.,
23rd November 1872. *Acting Chief Engineer for Irrigation.*

No. 139. From the Superintending Engineer, 8th Division, to the Secretary to Government, Public Works Department, dated Cokracolum, 2nd December 1872, No. 4,055.

IN continuation of my letter No. 3,165, dated 9th October 1872, I have the honour to bring to the notice of Government that the several Range Officers in this Division have represented that if the elaborate statements mentioned in G. O. No. 3,555, dated 6th November 1869, are required to be prepared by them, the under-mentioned temporary establishment will be necessary for the purpose. I respectfully solicit therefore the orders of Government on the subject.

2. I have in my letter quoted above already reported that it is quite impossible for Range Officers, with their present establishment, to collect and compile the information required; and I have nothing more to add save that if the Government be pleased to sanction the entertainment of the temporary establishment now applied for, the work will be set in hand at once.

MADURA RANGE.—One Writer and Accountant on a salary of Rupees 30 per mensem for four months.

DINDIGUL RANGE.—One Writer on Rupees 30 per mensem for six months.

SOUTHERN RANGE, TINNEVELLY.—One Writer on Rupees 30 per mensem for three months.

NORTHERN RANGE.—

Streevellipoottoor Sub-Division.

One Accountant on Rupees 30 per mensem for three months.

One Writer on Rupees 15 per mensem for three months.

Sattoor Sub-Division.

One Accountant on Rupees 30 per mensem for three months.

One Writer on Rupees 15 per mensem for three months.

No. 140. ORDER THEREON, 9th January 1873, No. 71.

IRRIGATION, No. 16.

HIS Excellency the Governor in Council resolves to communicate the above Note by the Acting Chief Engineer for Irrigation to all District Engineers; His Excellency hopes that under the new organization, these officers may find their establishment sufficient to enable them to fill in the information required for the Public Works Department without any additional assistance.

2. The remarks in paragraph 2 will be considered in the Revenue Department.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

No. 166. Read the following letter from the District Engineer, Chingleput, to the Secretary to Government, Public Works Department, dated Chepauk, 7th December 1872, No. 45 :—

I HAVE the honour to bring to the special notice of Government the assistance we have received from the Revenue and Police Authorities during the late stormy weather on the Chembrumbaukum, Red Hill, and Cholaveram Tanks.

2. Mr. Barlow has by his presence much encouraged the efforts of his subordinates in procuring labour when all our ordinary means failed in consequence of the pains which prevailed among the villagers principally interested in the tanks, who were also in greatest danger if any accident happened, and, therefore, fled to high ground at a distance.

3. The Tahsildar and Sheristadar of Sydapett Taluq and Sub-Magistrate of Palaveram were of the greatest service.

4. Of the Police I cannot say too much; all ranks appear to have bestired themselves most efficiently. The Deputy Inspector-General and Superintendent of Police were on the works themselves, the Perambore and Red Hill Station Officers anticipated any special orders, and were collecting coolies immediately after the news reached them of the possibility of any accident, and I cannot but attribute our safety from breaches in great degree to their early and useful action in bringing up men to the weak places, where Mr. Harington, Executive Engineer, Mr. Watkins, Supervisor, and Valoythan Moodelliar, Overseer, employed them to the best account.

5. Their exertions in all weathers and amid much exposure deserve all commendation.

No. 167. ORDER THEREON, 10th January 1873, No. 86.

IRRIGATION, No. 17.

HIS Excellency the Governor in Council is gratified to find how heartily all departments have concurred in working together to save the Chembrumbaukum, Red Hills, and Cholaveram Tanks when apparently endangered by the late heavy rains.

(Signed) G. W. WALRER, Colonel, R.E.,
Secretary to Government.

No. 170. Read the following letter from the Chief Engineer of the Madras Irrigation and Canal Company, to the Acting Chief Engineer for Irrigation and Joint Secretary to Government, dated Madras, 3rd December 1872 :—

I HAVE the honour to inform you that the cost of repairing the disasters caused by the floods of August 1870, in the first three sections of canal, amounting to Rupees 59,004, is still in suspense, and to request you to place the subject before the Madras Government with a view to a final settlement.

2. The expenditure has been made on the Government Orders,

					Rs.
G. O., No.	2,376,	dated	1st October 1870, sanctioning	... ...	*Nil*
Do.,	227,	,,	26th January 1871 ...	... ...	57,490
{ Do.,	841,	,,	21st March ,, ...	... ... }	6,130
{ Do.,	853,	,,	22nd ,, ,, ...	... ... }	
Do.,	953,	,,	31st ,, ,, ...	... ...	3,480
Do.,	968,	,,	1st April ,, ...	... ...	1,470
Do.,	1,089,	,,	18th ,, ,, ...	... ...	......

3. Some of this expenditure has been ordered to be debited to Revenue and some to Capital: the first positively for reasons correctly stated, the last not so positively for reasons subject to correction, and in opposition to previous decisions of the Madras Government, and in direct opposition to the decision of the Supreme Government.* In fact I consider the charging to Capital was insisted on until, and only until, doubts should have been cleared up regarding the previous completeness of each individual work breached. The terms made use of are these,† as the sanctioned expenditure "provides for carrying out either restorations or additions in sections of the canal which have not been reported complete, or in a safe state for the admission of a full supply of water, the outlay must be regarded as a charge to Capital," meaning, I suppose, until the state of previous completion of each work should be known, and excepting Calingulah No. 13, since ordered‡ to be charged to Revenue.

* G. O., No. 874 of 23rd March 1871.

† G. O., No. 227 of 26th January 1871.

‡ G. O., No. 1,089 of 18th April 1871.

4. My impression is that the origin of the doubt may be found in the letter of the Acting Consulting Engineer, attached to G. O., No. 2,376, of 1st October 1870. He seems to have suspected that the rainfall provided for in the sanctioned plans of canal works was insufficient; and on the 22nd November, 1869, he suggested that the canal should be tested by raising the water in the canal higher than the tops of the walls and banks constructed according to sanctioned plans in order to contain it. He suggested that the canal should be filled (to use the expression) six inches higher than the side walls of the Hindry Aqueduct and than the banks abutting thereon, as completed according to sanctioned design, never altered in that respect from the time they were first sanctioned in 1861 (or thereabouts). I need not go into this test question. I assume that for *all questions of account* the canal has since the time of this "suggestion" been determined to be complete, apart from such, or any special, test. The "suggestion" then first made may be wholly dismissed from one's mind in considering the proper head for any given charge. This could not have been admissible at the time when the Company's Agent and Manager remonstrated against the charging these repairs to Capital. The discussion then left the matter where it found it, and merely showed that the repair of one and the same work might be properly charged at one time to Capital and at another—when complete in fact—to Revenue.

G. O., No. 841 of 21st March 1871.

5. Since the date of the G. O. last quoted the completeness of the works has been so far proved that similar works to those which breached have been passed by Government as finished according to sanction; and no addition to

similar works has been since carried out, with the exception of a parapet wall 18 inches high, costing about 6 pence a foot run, to some of the walls. The repaired banks have not been raised higher than they were before, nor than bank of similar material elsewhere was and still is. The walls, where repaired, have been raised higher than before, because Government expressly ordered that walls should be made in future 18 inches higher than the original design which prevails elsewhere in the completed walls. Moreover, the canal has been in use for two seasons nearly, and has proved the efficiency of works similar to those which breached.

6. The only exception to the last paragraph is Calingulah No. 13, which has been restored in a very different form and on an entirely different principle to the one destroyed. But the cost of this restoration is already disposed of by G. O., No. 1,089, of 18th April 1871, as a charge on Revenue. With this exception the repairs have been executed in a way not appreciably more expensive than the original work, but, of course, with great care and with all the improvements known up to date.

7. The case is not one of *settlement* of earthwork, which the Consuslting Engineer rightly observed* is often chargeable to Capital for the first season after opening. The accident happened to completed works situated in a portion of the canal so far passed by Government as complete that it was then being worked under a Conservancy staff sanctioned by Government and charged to Revenue; and was supplying all demand for water required by the Government for irrigation. I append an extract† from the Consulting Engineer's letter, which is so clear that I need add nothing.

* His No. 121 of 27th August 1866.

† Appendix A.

8. In conclusion I beg that you will submit these facts to the Madras Government, and ask their approval (to use the words of the Governor-General in Council Proceedings of the Government of India, No. 41-A. I., of 23rd February 1871, paragraph 7, in regard to these very repairs) "that the charge for repairing breaches caused to the canal works by the floods of 1870 should be met from the Revenue of the Company so far as the gross earnings will allow, any deficiency in this respect being met, in the first instance, from the ordinary public works grant of the current year," and re-paid by the future receipts of the canal.

Extract from the Consulting Engineer's letter to the Agent and Manager, dated Anantapore, 27th August 1866, No. 121.

I AM unable to agree with you that the completion and use of the Canal in the 7th and 8th Sections has anything to do with the adjustment of the charges for the maintenance of those works in those sections which have been completed.

2. In the case of some descriptions of work, such as earthworks, it is usual, after completion, to allow maintenance for a limited period to be charged to Capital, because until such period has elapsed they are not really permanent works, or in a condition of permanence, and this is the only exception to the general rule that maintenance of permanent works should from date of completion be chargeable to Revenue and not to Capital. Were the masonry works and revetments of any section finished, the maintenance of these works would be chargeable against Revenue, although there might be other works in the section incomplete, and no revenue might have been derived from the section.

No. 171. ORDER THEREON, 10th January 1873, No. 88.

IRRIGATION, No. 18.

THE Government do not see any grounds for modifying the decision, as to the incidence of the expenditure incurred upon the restoration of the Madras Irrigation and Canal Company's Canal after the floods of 1870, which was come to in Proceedings, Madras Government, No. 1,089, of the 18th April 1871. That decision, as summarized at the end of paragraph 2 of their order is of general application, and, so far from being opposed, as Mr. Latham would appear to imagine, to the views of the Supreme Government, is in conformity with the practice which has determined the incidence of the similar expenditure of other Guaranteed Companies.

(Signed) J. MULLINS, Lieut.-Colone, R.E.,
Joint Secretary to Government.

No. 206. Read the following Proceedings of the Government of India, Public Works Department, (Irrigation,) dated Fort William, 4th December 1872, Nos. 1,030—1 I. :—

Liquidation of debentures by Madras Irrigation and Canal Company.

Read the following Despatch from the Secretary of State for India, to the Government of India, dated 22nd October 1872, No. 101.

IN reply to your Excellency's letter, dated the 29th of August, No. 106, requesting information respecting any further negotiations which might take place with the Madras Irrigation and Canal Company subsequent to the date of the last letter printed in the correspondence* laid before Parliament, I transmit a copy of a letter from the Secretary of the Company, dated the 2nd of August 1872; and I have to acquaint your Excellency that the sum of £41,000 was repaid by the Company on the 31st of August in liquidation of the four debentures specified in the margin, and that a further sum of £12,000 was repaid on the 11th instant in liquidation of debenture No. 5, dated the 9th of October 1867.

* Commons' Paper 197 of 1872.

No. 1,	dated	9th May 1867, for	£12,000
,, 2,	,,	5th June ,, ,,	12,000
,, 3,	,,	19th ,, ,, ,,	5,000
,, 4,	,,	3rd July ,, ,,	12,000
			41,000

From J. WESTWOOD, Esq., Secretary, London Board, Madras Irrigation and Canal Company, to the Under Secretary of State for India, dated 2nd August 1872, No. 8.

IN continuation of my letter to you of the 8th May last, I have the honour to state, for the information of the Secretary of State for India in Council, that the Act of Parliament there mentioned received the Royal assent on the 28th June last, but the same has not yet been printed, and, therefore, the Directors have not been able to procure a Queen's Printers copy thereof to use as evidence of their right to raise funds to pay off the debentures now held by the Secretary of State for India. Nevertheless, they purpose issuing at once an appeal to the public for subscriptions to the authorized loan, and they desire me to add that the results shall be communicated to His Grace at the earliest period.

ORDER.—Ordered that the foregoing be communicated to the Government of Madras, in the Public Works Department, Irrigation Branch, and also to the Financial Department of the Government of India for information.

(Signed) G. T. SKIPWITH, Captain, R.E.,
Asstt. Secy. to the Govt. of India.

No. 207. ORDER THEREON, 11th January 1873, No. 106.

IRRIGATION, No. 19.

COMMUNICATED to the Chief Engineer for Irrigation, in continuation of G.O., No. 2,958, of 13th December 1872.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

Read the following papers :—

No. 214. From the Deputy Secretary to the Government of India, Marine Department, to the Secretary to Government, Public Works Department, dated Fort William, 26th December 1872, No. 92.

IN transmitting the correspondence marginally noted, I am directed to request that you will move the Right Honourable the Governor in Council to cause the early issue of the necessary orders for the safe conveyance to Rangoon of the Godavery Flotilla Steamer *Shamrock* in direct communication with the Chief Commissioner, Central Provinces.

Copy of office memorandum from the Department of Agriculture, Revenue, and Commerce, No. 230, dated 13th instant, (*with enclosures in original*).
Copies of letter to Master Attendant, No. 44, dated 17th December 1872.
From do, No. 7,522, dated 21st December.
To Chief Commissioner, Central Provinces, No. 93 of this date.

2. The return of the original enclosures of the memorandum from the Department of Agriculture, Revenue, and Commerce dated 13th instant, when they are no longer required, is requested.

Office memorandum from the Under Secretary to the Government of India, Department of Agriculture, Revenue, and Commerce, to the (Military) Marine Department, dated Calcutta, 13th December 1872, No. 230.

IN forwarding the correspondence noted on the margin regarding the despatch of the Steamer *Shamrock* of the Godavery Flotilla to Burmah, the undersigned is directed to request that the necessary orders may be issued by the Marine Department for the proper fitting for and transport by sea of the vessel at the earliest possible moment; and that to save delay that department will kindly communicate with the Chief Commissioner of the Central Provinces direct.

Mineral Proceedings, March 1872, Nos. 4 to 10 B.
Public Works communication, No. 455 B. C., dated 29th October 1872.
To Public Works Department, No. 209, dated 7th November 1872.
From do., No. 477 C. B., dated 23rd idem (to be returned).

2. A copy of the letter addressed to the Chief Commissioner of the Central Provinces is forwarded herewith for information.

Proceedings of the Government of India, Marine Department, dated Fort William, the 17th December 1872.

READ office memorandum from the Department of Agriculture, Revenue, and Commerce, No. 230, dated 13th December 1872, forwarding correspondence* regarding the despatch of

* Therein detailed.

the Steamer *Shamrock* of the Godavery Flotilla to Burmah, and requesting that the necessary orders may be issued for the proper fitting and transport by sea of the vessel at the earliest possible moment.

No. 44.

THE above-quoted papers* are forwarded to the Officer in charge of the Master Attendant's Office for *very early report* as to the best and safest means of sending the *Shamrock* to Rangoon and the probable cost of the measure.

* Return requested.

(By Order,)

(Signed) B. E. BACON, Colonel,
Deputy Secy. to the Govt. of India.

From the Deputy Master Attendant in charge, to the Secretary to the Government of India, Marine Department, dated Calcutta, the 21st December 1872, No. 7,522.

WITH reference to your memorandum No. 44 of the 17th instant, and enclosures, herewith returned as requested, I have the honour to report, for the information of the Right Honourable the Governor-General in Council, that the best and safest mode of sending the *Shamrock* by sea to Rangoon is to have her towed by one of the British India Steam Navigation Company's Steamers sailing from Coconada to Rangoon. The *Shamrock* would require to have all the openings in her decks securely battened down and the float boards of her paddle wheels unshipped, and the Master Attendant, or the Marine Officer of the Port, should be directed to see that she is properly fitted for the passage across ; she should not leave Coconada later than about the 20th January 1873.

2. The cost of towing her would be Rupees 600 ; she would require a crew of five men to take her across, namely, one tindal, two seacunnies and two lascars ; and if the pay of lascars out of the port of Coconada is the same as out of this port, the amount would be for crew Rupees 93 and price of return deck passage from Rangoon to Coconada for the men Rupees 111-4-0.

3. The first steamer will leave Coconada on the 27th instant and the next four weeks afterwards.

From the Deputy Secretary to the Government of India, Military Department, to the Chief Commissioner, Central Provinces, dated Fort William, 26th December 1872, No. 93.

WITH advertence to the letter from the Department of Agriculture, Revenue, and Commerce, to your address, No. 229, dated 13th instant, I am directed to transmit, for your information and guidance, copy* of a letter addressed this day to the Government of Fort St. George requesting the issue of the necessary instructions for the despatch of the Steamer *Shamrock* to Rangoon, together with a copy of the Master Attendant's letter No. 7,522, dated 1st instant, on the subject.

* No. 92.

2. Any further communication you may desire to make in the matter had better be addressed direct to the Secretary to the Government, Fort St. George, Marine Department.

No. 215. Telegram from Colonel FISCHER, Rajahmundry through Dowlaishweram, to Colonel WALKER, Secretary to Government, Madras, dated 4th January 1873.

Shamrock is here in dock. Reported by Colonel Rundall unfit for sea after inspection. Will take three months to repair, and no funds available.

No. 216. ORDER THEREON, 11th January 1873, No. 110.

IRRIGATION, No. 20.

THE attention of the Godavery District Engineer will be called to G. O. No. 2,829 of 3rd December 1872, in which he was instructed to put the Steamer *Shamrock* and other floating stock in thorough working order, funds being provided by transfer from the Sungum Project.

2. Copy of his telegram will be forwarded to the Government of India with reference to their letter No. 92 of 26th December; copy of which and extracts of its enclosures will be forwarded to Lieutenant-Colonel Fischer for his guidance.

(True Extract.)

(Signed) G. W. WALKER Colonel R.E.,
Secretary to Government.

No. 217. (DOCKET No. 111, dated 11th January 1873.)

COPY of the above forwarded to the Government of India.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

No. 224. Read the following letter from the Assistant Secretary to the Government of India, Public Works Department, (Irrigation,) to the Secretary to the Government of Madras, Public Works Department, dated Fort William, 16th December 1872, No. 1,064-I. :—

I AM directed to acknowledge the receipt of your letter No. 2,834, dated 3rd instant, which has been transferred to the Department of Agriculture, Revenue, and Commerce for disposal, and to inform you that the statistical tables of area, cultivation, etc., concerning which information is called for, will not be required except every ten years, that being the period finally decided on.

No. 225. ORDER THEREON, 13th January 1873, No. 114.

IRRIGATION, No. 21.

COMMUNICATED to the Board of Revenue in continuation of G. O., No. 2,833, dated 3rd December 1872.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

Read the following papers :—

No. 230. From the Superintending Engineer of the 1st Division.
(Here enter No. 2,392, dated 30th September 1872.)

No. 231. Do. do. do.
(Here enter No. 2,830, dated 8th November 1872.)

No. 232. Do. do. 2nd Division.
(Here enter No. ——, dated 5th May 1872.)

Statement showing the mileage of sanctioned estimates for, and outlay on, Rajbuhas in the Godavery and Kistna Districts.

Canal.	Length of Canal in miles.	Miles of Rajbuha at end of official year.			Total outlay on Rajbuhas to end of official year.			Total amount of sanctioned estimates.			Average outlay on Rajbuhas per main line of canal.			Remarks.
		Completed.	In progress.	Total.	On Rajbuhas that have been completed.	On Rajbuhas in progress.	Total.	For Rajbuhas that have been completed.	For Rajbuhas in progress.	Total.	Completed Rajbuhas.	Rajbuhas in progress.	Total.	
Godavery District.					RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	
Range No. 1.														
Samulcottah Canal ...	30	12½	23½	36	6,962	......	6,962	6,962	21,155	28,117	232	......	232	New channel not yet commenced.
Cocanada Canal ...	32	79	5½	84½	35,282	......	35,282	35,282	4,500	39,782	1,102	......	1,102	
Mundapetta Canal ...	13	69½	......	69½	27,098	......	27,098	27,098	. ...	27,098	2,084	......	2,084	
Bank Canal	30	66½	......	66½	20,578	......	20,578	20,578	......	20,578	686	......	686	
Coringa Canal	23	99½	......	99½	23,428	......	23,428	23,428	......	23,428	1,019	......	1,019	
Injerum Canal	10	24¼	......	24¼	3,604	......	3,604	3,604	......	3,604	36	......	36	
Range No. 2.														
Central Delta, Main Canal	8	...	......	...	......	......	......	......	......	......	......	......	......	
Gunnarum or West Bank Canal.	28	162	......	162	57,313	......	57,313	57,313	......	57,313	2,047	......	2,047	
Amalapur Canal ... } Bendamurlunka Canal ... }	28	118	......	118	28,675	......	28,675	28,675	......	28,675	1,024	.. ...	1,024	
East Bank Canal ...	35	62	......	62	14,606	......	14,606	14,606	......	14,606	417	......	417	
Range No. 3.														
Western Delta	...	...	......	...	26,752	......	26,752	......	......	......	......	......	......	
Main Canal (from head sluice to Chettipett).	6	10½	......	10½	1,670	......	1,670	......	......	......	278·3	......	278·3	See statement embodied in G. O. No. 93, dated 13th January 1869.
Nursapur Canal including Kakarapura and Mogaltoor Canals.	37	247	26	273	61,710	4,088	65,798	......	29,770	......	1,668	110·5	1,778·5	NOTE.—In this are included "Bhupiah," "Rapaka," Chinchinada and Jinnur channels, which appear in statement embodied in G. O. No. 93 of 13th January 1869 as separate Main Canals, but are really only comparatively small irrigation branches (Rajbuhas of Nursapur Canal).

Bank Canal	24½	76	8	94	19,509	......	19,509	It is impossible to find out the amounts of estimates for works finished many years ago.	......	See remark in last column but one.	796	......	796	
Mukkamala	2½	10			1,632	......	1,632		6,175		653	......	653	
Gostinaddi and Velpur ...	29	52	No earth-work provided for, only masonry works.	52	15,292	......	15,292		8,060		527·3	......	527·3	NOTE.—The Velpur is *now* a branch of the *Bhupiah* which is from *Nursapur* Canal, but under new arrangements the Velpur becomes a branch of Gostinaddi.
Ellore Canal	40	....	73	73	28,629	59,745	*88,374		1,06,890		715·72	1,493·3	2,209·25	Mid and low level channels which are merely irrigation branches of Ellore Canal included and treated as "Rajbuhas." * Expenditure in years 1867-68, 1868-69, and 1869-70 obtained from No. 4 Range.
Venkiah and Weyaru and Akeed Canal.	30	26	14	40	34,519	......	34,519		10,460		1,151	......	1,151	NOTE.—In this are included "Chinnakapaverum channel and "Kudraykodu," which appear in statement embodied in G. O. No. 93 of 13th January 1869 as separate Main Canals, but are (1) the former an irrigation branch (Rajubha,) of Venkiah and (2) the *latter* now the "Akeed Canal."
Undi Canal	20	72	27	99	8,611	......	8,611		25,340		430·5	......	430·5	
Attali Canal	16	86	(Say) 10 not known for certain.	96	17,527	......	17,527		19,300		1,095	......	1,095	
KISTNA DISTRICT.														
EASTERN DELTA.														
Ellore Branch.														
Ellore Canal Proper ...	38	50	......	50	2,191	......	2,191	Cannot be ascertained.	......	Not known.	57·7	......	57·7	But every thing is still so incomplete that this cannot be considered final.
Budemair	29				10,084	......	10,084		......		347·7	......	347·7	
Masulipatam Canal.														
Masulipatam Canal Proper.	49	26	......	26	34,266	......	34,266		......		699·3	......	699·3	
West Side Channel... ...	30				433	......	433		......		14·4	......	14·4	
Pullairu Branch.														
Ryves Canal	17	10	......	10	5,118	189	5,307		311		301·0	11·1	312·1	
Gudevada Branch	20	21¾	......	21¾	7,321	......	7,321		......		366·0	...	366·0	
Pullairu Proper	26	45¼	2	47¼	18,328	536	18,864		5,000		704·9	20·6	725·5	
East Side Channel ...	10	...	......	......	30	......	30		... ..		3·0	......	3·0	
Butlerkodu	6	43	......	43	351	......	351		......		58·5	......	58·5	
Bantumilly Channel ...	22	...	......	......	......	......	......		......		...	......	......	

Statement showing the mileage of sanctioned estimates for, and outlay on, etc.—(Concluded.)

Canal.	Length of Canal in miles.	Miles of Rajbuhas at end of official year.			Total outlay on Rajbuhas to end of Official year.			Total amount of sanctioned estimates.			Average outlay on Rajbuhas per main line of canal.			Remarks.
		Completed.	In progress.	Total.	On Rajbuhas that have been completed.	On Rajbuhas in progress.	Total.	For Rajbuhas that have been completed.	For Rajbuhas in progress.	Total.	Completed Rajbuhas.	Rajbuhas in progress.	Total.	
					RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	
Pullairu Branch.-(Concld).														
Polerajukodu	17	21½	......	21½	10,269	......	10,269		......		604·0	......	604·0	
Kaliduidy Channel ...	22	30¾	......	30¾	176	......	176		......		8·0	......	8·0	
WESTERN DELTA.														
Nizampatam Canal.														
Nizampatam Canal Proper...	42	70 (for the three channels)	5½	75½	34,899	588	35,487	Cannot be ascertained.	642	Not known.	830·9	14·0	844·9	
Eastern Side Channel ...	25				1,176	532	1,708		771		47.0	21·3	68·3	
Western Side Channel ...	25				1,238	194	1,432		162		49·5	7·7	57·2	
Western Bank Channel.														
Western Bank Channel Proper.	46	21½	1	22½	19,220	523	19,743		1,487		417·8	11·4	429·2	
Vellatur Channel	10	20	2½	22½	5,654	536	6,190		851		565·4	53·6	619·0	
Iskapully Channel	13	...	......	......	......	......	......		......		......	......	......	
Commamoor Channel.														
Commamoor Channel Proper.	50	70	10	80	35,198	1,058	36,256		1,205		703·9	21·2	725·1	
Tungabudra	12	15½	20	35½	6,672	22,098	28,770		46,420		556·0	1,841·5	2,397·5	

No. 233. ORDER THEREON, 13th January 1873, No. 117.

IRRIGATION, No. 22.

ORDERED that the following letter be sent.

(Signed) J. MULLINS, Lieut-Colonel, R.E.,
Joint Secretary to Government.

No. 234. From the Secretary to the Government of Fort St. George, Public Works Department, to the Secretary to the Government of India, P.W.D., dated 13th January 1873, No. 118.

IRRIGATION, No. 23.

SIR,—With reference to Circular No. 77, dated 23rd December 1871, I am directed to transmit, for the information of the Government of India, a statement showing the mileage of sanctioned estimates for, and outlay on, "Rajbuhas" or distribution channels in the Godavery and Kistna Districts during 1871-72.

No. 246. Read the following Endorsement of the Chief Engineer for Irrigation, dated Fort St. George, 6th December 1872, No. 65:—

From the Acting Manager of the Madras Irrigation and Canal Company, to the Acting Chief Engineer for Irrigation, dated Madras, 26th July 1872, No. 183.

I HAVE the honour to hand you, with reference to your letter No. 31 of 14th June 1872, copy of letter which I have received from the Acting Chief Engineer.

2. That Officer's further report shall be communicated to you as soon as it reaches me.

From the Acting Chief Engineer, to the Acting Manager of the Madras Irrigation and Canal Company, dated Kurnool, 22nd July 1872, No. 434.

YOUR No. 302 of 10th instant.

I have the honour to inform you that there is still a very considerable quantity of land applied for but not yet made over to the Company formerly.

In the absence of my office records, I am unable to give the exact average, but on my return to Kurnool in about ten days I hope to supply you with full information.

After all of the land which has been applied for by the Company's Engineers is made over to the Company, we will probably not require more than 50 additional acres each year for extension of the present channels, but there is a very great deal of work in arrears at present.

From the Acting Manager of the Madras Irrigation and Canal Company, to the Acting Chief Engineer for Irrigation and Joint Secretary to Government, dated Madras, 7th August 1872, No. 196.

In continuation of my letter No. 183 of 26th ultimo. I have the honour to hand you copy of a further report from our Acting Chief Engineer with reference to the work remaining to be done in connection with the transfer of land to the Company.

From the Acting Chief Engineer, to the Acting Manager of the Madras Irrigation and Canal Company, dated Kurnool, 3rd August 1872, No. 452.

In continuation of my letter No. 434 of 22nd ultimo, I have the honour to enclose a statement showing the number of land plans yet with the Deputy Collector of Kurnool District.

From this statement it will be seen that fifty-six sheets of plan describing 1,215 acres and 26 cents of land are still with the Deputy Collector for examination and measurement.

To measure and examine 1,215 acres of land in one square block would not occupy a Surveyor long, but when the land is in detached and narrow strips, scattered over a great area of country, the work becomes much more laborious. I am not aware of the state of forwardness of the work now in the Deputy Collector's office, but I should think the examination of 1,215 acres of such land plans as ours would occupy an ordinary Surveyor about three and a half months.

At present there are no arrears in this office in applications for land, so that the estimate of our future requirements given in my letter No. 434 of 22nd July 1872, may be accepted as applying from this date. That is to say the Deputy Collector has still to hand over 1,215 acres of land already applied for by us, and will probably have to hand over about 50 acres of land not yet applied for each year for some years to come.

List of Land Plans Numbers not yet returned by Deputy Collector at Nundial.

Plan No.	—	Class of land. A.	B.	C.	D.	Letters. No.	Date.
	Main Canal.						
379	Land Plan ...	0·68	...	...	...	50	28th July 1869.
386	Do. ...	...	2 71	...	...	55	14th May 1870.
400	Do. ...	4 89	0·82	...	...	101	14th Dec. 1869.
408	Do. ...	581·98	56·50	...	0·93	42	31st March 1870.
413	Do. ...	0·42	0·17	...	0·33		
414	Do. ...	0 82	0·43	...	...		
415	Do. ...	1·01	1·82	...	...	78	14th July 1870.
416	Do. ...	0·74	0·20	...	0·06		
423	Do. ...	38·07	...	...	...	91	24th August 1870.
424	Do. ...	0·98	...	...	...	92	1st Sept. 1870.
432	Do. ...	5·94	...	...	...		
433	Do. ...	31·21	...	...	...	8	20th Feb. 1872.
434	Do. ...	6·19	...	...	...		
446	Do. ...	25·49	...	...	...	6	12th Feb. 1872.
14	Total...	698·42	62·65	...	1·32	...	
	Distribution.						
10	Land Plan ...	8·12	...	...	...	84	19th October 1869.
25	Do. ...	1·83	...	...	...	47	11th April 1870.
26	Do. ...	29·26	...	...	...	41	30th March 1870
27	Do. ...	74 07	...	...	...		
30	Do. ...	17·25	...	...	...		
33	Do. ...	19·46	...	...	..		
36	Do. ...	10·05	...	...	...	48	11th April 1870.
37	Do. ...	53·71	...	...	...		
38	Do. ...	12·42	...	...	...		
39	Do. ...	10 96	...	...	...		
42	Do. ...	17·09	...	...	...		
48	Do. ...	1·63	...	...	...	64	9th June 1870.
49	Do. ...	2·58	...	...	...		
61	Do. ...	2·28	1·38	...	...	82	28th July 1870.
70	Do. ...	7·49	...	...	...		
71	Do. ...	10·43	...	...	...	36	27th April 1871.
72	Do. ...	6·64	...	...	...		
73	Do. ...	32·68	...	...	...		
74	Do. ...	22·93	...	...	...		
75	Do. ...	11·24	...	...	...	30	19th April 1871.
76	Do. ...	11·53	...	...	...		
77	Do. ...	3·64	...	...	...		
126	Do. ...	6·83	2·13	...	...		
127	Do. ...	4·05	1·73	...	...	33	21st April 1871.
128	Do. ...	1·02	1·86	...	...		
129	Do. ...	2·58	...	...	...		
139	Do. ...	42·72	...	...	0·48		
141	Do. ...	1·80	...	...	...	43	25th May 1871.
144	Do. ...	5·75	...	...	...		
152	Do. ...	9·17	...	...	...	44	1st June 1871.
153	Do. ...	3·67	...	...	...	5	5th Feb. 1872.
31	Total...	444·88	7·10	...	0·48	...	

List of Land Plans Numbers not yet returned by Deputy Collector at Nundial.

Plan No.	—	Class of land.				Letters.	
		A.	B.	C.	D.	No.	Date.
	Telegraph.	Sq. Yds.		Sq. Yds.			
15	Land Plan ...	84	...	...	...	9	5th May 1869.
16	Do. ...	76	...	..	...		
17	Do. ...	368	...	...	...		
18	Do. ...	224	...	...	...		
19	Do. ...	204	...	...	...		
20	Do. ...	248	...	32	...		
21	Do. ...	96	...	...	...		
22	Do. ...	140	...	...	...		
23	Do. ...	180	...	...	...		
24	Do. ..	16	...	...	...		
25	Do. ...	308	...	...	...	10	10th May 1869.
11	Total...	1944	...	32	...		
	" "	Acres. 0·40	...	Acres. 0·01	...		
56	Grand Total...	1143·70	69·75	0·01	1·80		

Number of sheets applied for by the Divisional Engineers but not yet sent to the Deputy Collector from Central Office.

Nil.

(Signed) C. DAWSON,
Chief Clerk.

Submitted for the information of Government with reference to G. O. No. 75 of the 10th June last.

2. The correspondence shows that, in August last, the Madras Irrigation and Canal Company's Officers had furnished the Collector of Kurnool with the following land plans which had not then been disposed of:—

No. of Plans.	Areas.	Class of land.			
		A.	B.	C.	D.
14	*For Main Canal.*	698·42	62·65	...	1·32
31	*For Distribution Channels.*	444·88	7·10	...	0·48
11	*For Telegraph.*	0·40	...	0·01	...
56	Total...	1143·70	69·75	0·01	1·80

The statement attached to the Acting Chief Engineer's letter No. 452 of the 3rd August last, shows that some of these plans had been for a very long time in the hands of the Revenue Department.

3. Should the sanction given in G. O., Revenue Department, No. 866 of the 4th June 1872, for the retention of the special establishment engaged in making over land to the Company not suffice to clear off the arrears, it will probably be convenient to allow the Deputy Collector a little more time for this purpose; but, for the moderate amount of work—the transfer of 50 acres a year—of this kind to be done thereafter, it seems clear that the ordinary Revenue taluq establishments will suffice. Lands for distribution channels are usually long narrow strips, and, with the information furnished by the Company, the examination of these can hardly be otherwise than a very simple matter.

(Signed) J. MULLINS, Lieut.-Colonel, R.E.,
Chief Engineer for Irrigation.

No. 247. ORDER THEREON, 14th January 1873, No. 124.

IRRIGATION, No. 24.

THE Revenue Department will be informed, with reference to G. O., Revenue Department, No. 866, dated 4th June 1872, that, while it may be advisable to retain a special establishment for the transfer of land to the Madras Irrigation and Canal Company so long as may be really necessary for disposing of the land plans already submitted by the Company's Officers, it is considered in this department that the future transactions of this kind, which are estimated to amount to about 50 acres a year, will be so trifling in extent that the ordinary taluq establishment will be quite sufficient for their management.

(Signed) J. MULLINS.-Colonel, R.E.,
Joint Secretary to Government.

No. 254. Read the following letter from the Deputy Secretary to the Government of India, Public Works Department, (Irrigation,) to the Secretary to the Government of Madras, Public Works Department, (Irrigation Branch,) dated Fort William, 29th November 1872, No. 1,023-I:—

I AM directed to acknowledge the receipt of your letter, No. 1,509 of the 19th ultimo, and accompaniments, relative to the reservoirs which the Madras Irrigation and Canal Company contemplate constructing on tributaries of the River Toombuddra in connection with their works.

2. Of the three schemes mentioned it is recommended by the Government of Madras that two—the Toonga and Choardy or Masoor projects—should, for reasons given, be abandoned, and the third only, that is the reservoir on the Budra above Luckwully, carried out as likely to prove successful and remunerative.

3. The only detailed information as yet before the Government of India regarding these reservoirs is contained in the Proceedings of the Madras Government marginally noted. From the reports of Colonel Mullins reviewed

March 1866, No. 229.
,, 1867, ,, 916.
January 1869, Nos. 251 and 356.
April 1872, No. 314.

therein, it appears that the site at "Luckwully" affords great facilities for constructing a reservoir economically.

4. Of the Toonga reservoir complete information was not at the time available, but Colonel Mullins observes, "a dam across this part of the Toonga will form such a large reservoir at so reasonable a proportionate outlay that it will be advisable to ascertain exhaustively what natural facilities for its construction exist," and he adds, "should it be found impracticable to obtain a suitable site for a detached weir near this part of the river, there is another site for a dam some miles higher up which will probably do for a reservoir of large, though not of such large dimensions as could be obtained by making a dam at one of the lower sites. This place is at the end of the hill running north north-west from Mailagapett, a village on the south side of the river." As no further detailed information regarding this site has yet been laid before this Government, or whether the alternative site has yet been examined, it seems to the Governor-General in Council inexpedient to wholly abandon the idea of constructing a reservoir on the Toonga, as possibly the upper site alluded to by Colonel Mullins may not involve such interference with existing interests as the Madras Government describes is connected with the lower site.

5. With regard to the site at Masoor on the River Choardy, which the Madras Government also considers exceptionable, if constructed on the scale contemplated by the Irrigation Company, the Governor-General observes that Colonel Mullins reports as follows:—

"The Masoor Reservoir project is from its comparatively moderate dimensions, and estimated cost, better fitted than any other which has thus far been brought under notice for a first experiment. * * * *
As regards the interest of the Bombay Government in the supply of water from the Choardy, there would seem to be no difficulty in providing by arrangement for its security to the fullest possible extent. The Bombay irrigation could not possibly be injured by the construction of the reservoir."

As the site is not within the limits of the Bombay Presidency, the Government of India considers there can scarcely be any insuperable interference with the interests of that Government; while as regards the other evils complained of, it seems from Colonel Mullins' report to be more than probable that the old reservoir, as originally constructed, submerged, if not all, at least a very large proportion of the land at present cultivated. Moreover, it seems possible that a reservoir of smaller dimensions could be made, and while profitable for the purposes required, would at the same time avoid some of the principal objections to which, on its present scale, it appears to be open.

See paragraph 24 of Colonel Mullins' report. Proceedings, Madras Government, January 1869, No. 357.

6. The storage of water in connection with the Toombuddra project is evidently of vital importance, whether as regards the country affected by it, or the interests of the State which is now burdened with the payment of the guaranteed interest thereon. The construction of reservoirs has already been approved by Her Majesty's Government, and the Governor-General in Council in view of the necessity that exists for placing this project in a position to become remunerative at the earliest possible period, considers that, in the absence of more detailed information, the Government of India will not be justified in abandoning the construc-

tion of the proposed works, until it has been more clearly shown that they are impracticable either from disproportionate costliness, or the impossibility of providing adequate compensation for the injury of existing interests. This latter point seems rather to have been assumed than demonstrated in the papers now reviewed.

7. It is observed that Colonel Mullins is about returning to India, and as his report contains the only information regarding these works as yet laid before this Government, His Excellency in Council would suggest to the Government of Madras the desirability of calling for a further expression of that officer's opinion in the light of such additional information as may have been acquired since the former reports above quoted from were written, and further that as the Inspector-General of Irrigation Works is about to visit the Madras Provinces, advantage may be taken of his presence to have all the points connected with these reservoirs thoroughly discussed between himself and the Chief Engineer of Irrigation.

8. Meanwhile, the Government of India will defer passing any definite orders regarding the abandonment or otherwise of the two sites referred to in your letter under reply.

No. 255. ORDER THEREON, 14th January 1873, No. 128.

IRRIGATION, No. 25.

ORDERED to be communicated to the Chief Engineer for Irrigation, who will, after examination of all the information regarding reservoir sites available up to the present time and communication with the Chief Engineer and Agent of the Madras Irrigation Company, submit a memorandum explaining clearly the circumstances of the sites on the Toonga and Choardy.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

No. 321. Read the following endorsement of the Financial Department, dated 13th November 1872 :—

Read the following Proceedings of the Board of Revenue, dated 8th November 1872, No. 2,162.

Read the following letter from the President of the Local Fund Boards, Godavery District, to the Secretary to the Board of Revenue, dated Cocanada, 17th July 1872, No. 76.

I HAVE the honour to submit, for sanction, an estimate,* etc., amounting to Rupees 27,000, for cutting a navigable canal in the island of Nagaram, Nursapur Taluq.

* 1 Survey Plan.
2 Sketch Maps.
1 Estimate.

2. The Local Fund Board of the Cocanada Circle have at a meeting held on the 15th instant passed the estimate on the understanding that the cost of the "Syphon sluice" and "Embanking drain," provided for in the estimate, namely, Rupees 10,000, should be met from Imperial Funds.

3. The Superintending Engineer's letter received with the estimate has this day been submitted to the Board of Revenue with Collector's letter No. 220.

4. I request therefore that the cost of cutting the canal, namely, Rupees 17,000, may be placed at the Superintending Engineer's disposal from the balance of the Road Fund.

ENCLOSURE No. 1.—Survey Plan.

ENCLOSURES Nos. 2 and 3.—Sketch Maps.

ENCLOSURE No. 4—Estimate.

THE survey map, and estimate amounting to Rupees 27,000, for cutting a navigable canal in the island of Nagaram (length four miles) in the Cocanada Circle of the Godavery District, are submitted for the sanction of Government.

2. The component parts of the estimate are as follow :—

	RS.
1. Cutting	17,000
2. Embanking drain	6,000
3. Syphon sluice, etc.	4,000
Total...	27,000

3. The necessity for the work has been fully set forth in Colonel Fischer's letter to the President of the Local Fund Board, dated 3rd July 1872, No. 1,279, a copy of which is herewith forwarded.

4. The President states that the Local Board have passed the estimate on the understanding that the cost of the syphon sluice and embanking drain therein provided, namely, Rupees 10,000, which properly appertains to Irrigation, will be met from Imperial Funds, as suggested by the Superintending Engineer, and requests that the remainder of the estimate, Rupees 17,000, may be allotted from the unappropriated balance of the Road Fund.

5. The Board request that Government will be pleased to authorize a grant of Rupees 10,000 from Imperial Fund.

6. On the receipt of sanction to the estimate, the Board will make the required allotment from the Road Fund of the circle.

REFERRED to the Department Public Works for remark.

(Signed) W. HUDLESTON,
Officiating Chief Secretary.

No. 322. ORDER THEREON, 17th January 1873, No. 160.

IRRIGATION, No. 26.

ON the 20th May last Lieutenant-Colonel Fischer brought his scheme, for connecting the Vasista and Vanitiyaur branches of the Godavery by a navigable canal across the Nagaram Island under the consideration of the then Acting Chief Engineer for Irrigation, and in G. O., 29th July 1872, No. 1,803, the idea was approved and the Superintending Engineer was instructed to provide for this work in the revised estimates for the Central Delta project.

2. Colonel Fischer a short time after sending his letter to the Chief Engineer, addressed the President of the Local Fund Board, Cocanada Circle, strongly urging the carrying out of this scheme from Local Funds, and the Board now propose to contribute Rupees 17,000 to the cost of the work, if the Government

will provide the balance, Rupees 10,000, of Colonel Fischer's estimate, out of Imperial Funds.

3. The project has not yet assumed a shape in which it can be sanctioned by the Government. The estimate of Rupees 27,000 is but an approximation; the proposal to pass irrigation water under the canal by a single syphon is one which may be feasible, but it has yet to be properly and fully explained by surveys and levels. All therefore that can be said at present is that the Government on the *prima facie* evidence which has been adduced, have generally approved the scheme, and that when it is properly matured it will receive full consideration. As providing a local communication, the project is one which has a claim on Local Funds, while, as connected with the improvement of the delta system, it is probable that the Supreme Government will not be indisposed to sanction part of the cost from Loan Funds.

(Signed) J. MULLINS, Lieut.-Colonel, R.E.,
Joint Secretary to Government.

No. 326. Read the following letter from the Officiating Deputy Secretary to the Government of India, Public Works Department (Irrigation), to the Joint Secretary to Government of Madras, Public Works Department (Irrigation Branch), dated Simla, 8th October 1872, No. 874-I.

In continuation of this office letter, No. 402 I., of the 29th September 1870, I am directed to forward, for information, copies of remarks by Mr. Dejoux on Colonel Brownlow's report on cement manufacture and of that officer's reply thereto, including the drawing of the machine recommended by him for testing cement.

Remarks on Lieutenant-Colonel Brownlow's Report.

"*Paragraph* 8.—Cost of Portland Cement in North-Western Provinces of India."

The rates estimated by Lieutenant-Colonel Brownlow for cement delivered in Delhi are very correct; but it will not do to calculate on more than four cubic feet of cement in pretty good order in a cask, as the remainder will be found spoilt during the shipping or during transit from Calcutta to Delhi.

I have myself received in Calcutta nearly 10,000 casks of cement, and from experience I always found an average of four cubic feet of cement in good order per cask.

Accordingly the rate of Portland Cement at Delhi should be 5·66 instead of 5·2.

"*Paragraph* 9.—Improbability of our being able to make in India a cement professing the extraordinary tenacity of the Portland."

I do not quite agree with Lieutenant-Colonel Brownlow as regards the advantage in India of using clay and pure slaked lime instead of clay and chalk. Without considering the increase in the cost on account of the double burning, I think the burning is always more difficult in one case than in the other, and the tenacity of the cement is never so good.

If a prejudicial action takes place on account of the oxyde of iron, I would advise the use of clay either entirely free from, or containing a small portion of, it.

Many cement stones in France yielding cements nearly as good as Portland Cement contain little or no oxyde of iron.

"*Paragraph* 10.—Ratio of reduction of strength of Portland Cement by admixture with sand; limit of cost of cement manufactured in India."

In the case of Portland Cement sent from such a distance as England to Delhi, the cement will always lose a certain amount of its strength.

My experience authorizes me to say that it loses, in ordinary circumstances, one-fourth of its strength, and if left in godowns for six months it will lose at least one-third of its original strength.

It should be borne in mind that the cement casks are always placed at the bottom of the ships and exposed to the moisture and dampness therein; that the unloading in Calcutta is, and will always be, done in a more or less careless manner; and that the great heat of this country affects the quality of the cement to a certain extent.

Considering the question of the loss of strength in the cement imported from England, my opinion is that it is possible, if great care is taken in the manufacture, to make in India cements, artificial or natural, which will be about the same kind and the same quality as some of the French cements, which, excepting the Boulogne Cement, possess from one-fourth to one-fifth of less tenacity than the English Portland Cement of good quality. Such being the case, the cement which will be manufactured in India may be as good as that received from England; but, of course, at the same time one-fourth inferior (for the reason above adduced) to the cement of fresh quality used at Home.

"*Paragraph* 11.—Rough estimate of cost of manufacture in India."

The rough calculations I have made about the probable cost of cement manufactured in India show that it will vary from 1 Rupee to 1 Rupee and 4 Annas per cubic foot in the case of artificial cement, and from 9 Annas to 14 Annas in that of natural cement.

Note to paragraph 12.
Silica Alumina.

In the Bengal ghooting or kunkur stones I have analyzed I found a proportion of clay varying from 26 to 34 per 100.

This result impressed me with the idea of trying the possibility of manufacturing either Roman or Portland Cement with such stones, in pulverizing those which were not too hard, and making bricks, etc., or in extra burning, in their natural state, those which are homogeneous.

I may now safely say that, as regards preliminary experiments, I have already succeeded in obtaining slow and quick-setting cements, although I am proceeding with further experiments on that score.

"*Paragraph* 13.—Supposing it be decided on to commence manufacturing in India, I think we should aim first at the utmost simplicity of machinery and plant employed."

I quite agree with Lieutenant-Colonel Brownlow as regards his proposal to aim first at the utmost simplicity of machinery and plant necessary for the manufacture.

"*Paragraph* 16 —Fuel to be employed."

I am of opinion that the best kind of fuel for burning Portland Cement is coke, and will place charcoal in second order.

But coal also may answer, as I have seen it used in France.

As I am, however, about to try to burn cement with coal, I will be able in a short time to afford a more decided opinion on the subject.

"*Paragraph* 18.—Sketch of process of manufacture."

I do not quite agree with Lieutenant-Colonel Brownlow as regards his opinion of using for the mixture of materials the dry and German system instead of the wet English.

It may be said that principally, when using pure slaked lime and clay, the German system is superior to a certain extent, but it is also more expensive.

Mr. Reid in his treatise about cement says that the two principal inconveniences arising from the English system are—

1st.—That a much larger area is necessary in the English system than in the German one, and consequently, in a country where the value of the land is always high, it increases to a great extent the amount of the capital invested in the manufacture of cement.

2ndly.—That it requires about two months for the materials in the vats to dry before being moulded into bricks.

As regards the first point, there is at present in India hardly any difficulty in the acquisition of land under the provisions of Act X. of 1870.

Referring to the second point, I should say that in a country so hot as India, the evaporation being much more rapid, it is to be expected that the time necessary for drying will be comparatively *much* less.

"*Paragraph* 19.—Sketch and process of manufacture." I think the proportion of materials used in the manufacture of artificial Portland Cement will vary as follows :—

1*st*.—For artificial cement made of a mixture of chalk and clay—

From 3 chalk and 1 of clay (in measure).

To 4 chalk and 1 of clay.

2*nd*.—In the case of artificial cement made of pure slaked lime and clay—

From 5 lime and 2 of clay (in measure),

To 5 lime and 3 of clay.

Suggestions about manufacture of Portland Cement.

Except the remarks I have already made I quite agree with Lieutenant-Colonel Brownlow on all other points. I would, however, advise, as regards the details of manufacture, to follow the treatise of Mr. Reid on cements.

2. *Kilns.*—As regards kilns for a small factory, I would advise their construction according to the sketch (Figure 2) of Mr. Reid's book, but making them one-third smaller and increasing the height of the tapering dome by three feet.

3. *Experiments.*—I would advise the construction at once of a small kiln, as per sketch annexed, for the trial of samples of different kinds of lime and clay in various proportions; the balls for samples may be made of clay and chalk, or lime reduced in impalpable powder and mixed in water in a tub: the water is on the following day to be removed by decantation, and the substance is then to be exposed to the sun until the evaporation reduces it into a plastic paste; with this balls may be made about two inches in diameter and dried well; these balls may then be burnt, and, when reduced to powder, a stiff mortar made with the cement thus obtained, which can be tested under water by means of the Aiugille of Vicat. Some cakes or balls made with this mortar may be left exposed to the air.

4. *Natural Cement.*—In France the Engineers have been using for several years cements proceeding from the burning, in the same way as for Portland Cement of marly clays of different kinds.

I have already found from the hills of Margohi and Rohtas, near Dehree, in the Soane Circle, two kinds of clay, which (mixed together in certain portions, and at times with a feeble addition of pure clay) will yield Portland and Roman Cement. I send some samples of these for transmission to the Chief Engineer to the Government in the North-Western Provinces, and would like to know if clay of similar descriptions cannot be found in or near the lime quarries in the North-Western Provinces; and, if so, I would desire one cubic foot of each sort to be sent to me.

Every sort of clay giving a strong effervescence with hydrochloric acid may be considered as marly clay, and may be found useful in the manufacture of cements.

The analysis of the sorts of clay of which I send samples give the following results :—

Yellow Marly Clay.	
Carbonate of Lime	60·65
Do. of Magnesia ...	14·35
Oxyde of Iron	0·67
Clay { Silica. Alumina. }	23·33
Sand	1·00
Total...	100·00

White Marly Clay.	
Carbonate of Lime	80·00
Do. of Magnesia traces, but not appreciable.	
Oxyde of Iron, do. do. do.	
Clay { Silica. Alumina. }	20·00
Sand	0·00
Total...	100·00

5. *Cement of Boulogne.*—The best marly clay used in France is that found in Boulogne, with which Messrs. Demarle and Co. manufacture a cement in high demand in France.

I have been using it in large quantities for three years in the manufacture of artificial stone (Coignet's system), and found it even sensibly better than the Portland Cement of Messrs. White Brothers, which is considered as one of the best sort in England.

The Boulogne marly clay contains from 19 to 25 per 100 of clay.

Every sort of clay containing more than one-fifth per 100 of sand is to be rejected.

To be certain of a good homogeneity, the clay is pulverized and mixed with wtaer in vats, the water is then removed by decantation, and, the clay being thus, by evaporation, in a sufficiently stiff state to be moulded, balls are made of it and burnt in a kiln up to a white heat.

The white heat is necessary for the spreading of the bad parts, which are picked and rejected carefully after the burning.

The cement is afterwards ground in fine powder and sifted through a sieve of 60 meaches to one inch.

6. *Cement in the neighbourhood of Paris.*—Sometimes clays may be found homogeneous enough to enable their being burnt without the process of either pulverization or washing. The clay found near Paris contains about the same proportion of silica and alumina as that of Boulogne Such descriptions of marly clay are found (in beds) close to the beds of gypsum (or sulphate of lime); great care must, however, be observed in selecting them to avoid the mixture of gypsum with them. These may be burnt in their natural state and treated after the same manner as the cement of Boulogne.

The best factories are those of Messrs Barbier and Co. at Paris, Chronne, and Argenteuil, Messrs. Slacker and Letellier at the Butts Chanmont, the Moulineaux, and the Rainey.

I used these cements, particularly the first sort, for the building of several miles of sewer in Paris, and found it not much inferior to the English Portland.

7. *Marly Clays.*—I feel almost sure that marly clays of about the same composition as those of Boulogne or Paris may be found in the proximity of many lime quarries now existing in India, and I opine, therefore, that a careful search will enable the discovery of materials well adapted for the manufacture of cement, and producing a cement less expensive than artificial cements.

8. *Bulk of each material required for experiments.*—As regards the quantity of materials which will be required for experiments, I think for the manufacture of artificial cement three cubic feet of lime-stone and two of clay of each sort may be sent, and if stones or marly clay, supposed to be natural cement stones, are found in the Sewalik Range, a cubic foot of each kind will do for the present.

SEALDAH, NO. 138, BALIAGHATTA ROAD, *5th June* 1872. (Signed) P. DEJOUX, *Ex. Engr., Cement Experiments Division.*

Note by Lieutenant-Colonel H. A. Brownlow, R. E., Officiating Chief Engineer of Irrigation Works, North-Western Provinces, on Mr. Dejoux's remarks on Lieutenant-Colonel Brownlow's report on manufacture of Cement in India, dated 15*th July* 1872, *No.* 1,516-I.—C.

Use of pure slaked lime instead of chalk.—I recommended this because we have no chalk in this part of India, and I think burning the lime-stone will be found cheaper than grinding it to an impalpable powder. It is only a question of economy, and the cheapest process should be adopted.

Use of clay, free from oxyde of iron.—The supposed prejudicial action of oxyde of iron is, as will be seen from conclusion of paragraph 15 of my report, more than doubtful, and the action which takes place in the burning of Portland Cement between the oxyde of iron in clay and the chalk (see paragraph 9 of my report), is understood to be most beneficial. I alluded to it in explanation of my remark that a cement of the same tenacity as Portland could not most probably be produced in India, where I proposed to use slaked lime instead of chalk, so that I do not think clay should be rejected because it contains oxyde of iron so long as the proportion does not exceed fifteen per cent.

Loss of strength in imported Portland Cement.—Mr. Dejoux's experience seems to decide the question in favour of manufacture in India.

Process of manufacture.—While maintaining my opinions with some diffidence against those of Mr. Dejoux, who has a practical knowledge of his subject, I would suggest, as a further objection to the adoption of the "wet" or English system of mixing the raw ingredients of cement, that in these Provinces, for about four months in the year, the mixture in the settling reservoirs would be largely adulterated by sand and organic impurities driven on to it by the wind, and that during the rainy season the evaporation would be even slower than in England. Although more expensive, there can, I think, be no doubt of the superiority of the German over the English system of manufacture.

Testing the burnt cement.—Regarding the use of the Aiguille de Vicat for this purpose, I would remark—first, that it is only a test of rapidity of setting, and gives no idea of cohesive strength of the mortar; second, although remarkable quickness of setting is not necessarily accompanied by inferior hardness and strength, yet it is somewhat curious that within the range of experiments quoted by General Gillmore in his treatise on limes and hydraulic cements, the quickest setting cements gave ultimately the worst, and the slowest setting the best, results; third, that General Gillmore gives it as his decided opinion *that the needle test is far less reliable than any simple device for trying the cohesive strength of the mortar when ten or twelve days old.* The test proposed by me in paragraph 12 of my report is that universally adopted in England, and largely on the Continent as well, and I, therefore, strongly maintain its superiority over Monsieur Vicat's needle. The accompanying sketch shows an excellent form of testing machine and a better pattern of mould for making up the bricks to be tested than that shown in paragraph 12 of my report. They are both taken from Mr. Grant's admirable paper on Portland Cement (see Proceedings of Inst. C. E., Vol. XXV., Session 1865-66).

No. 327. ORDER THEREON, 17th January 1873, No. 163.

IRRIGATION, No. 27.

COMMUNICATED to District Engineers in continuation of G. O., No. 2,622, of 2nd November 1870.

(Signed) J. MULLINS, Lieut.-Colonel, R.E.,
Joint Secretary to Government.

Read the following papers :—

No. 342. From the Assistant Secretary to the Government of India, Public Works Department, to the Joint Secretary to Government, Public Works Department, (Irrigation Branch,) dated Fort William, 28th November 1872, No. 1,021-I.

IN acknowledging the receipt of your letter No. 2,521 of the 25th ultimo, forwarding a Note by the Acting Chief Engineer for Irrigation explaining that it was Mr. Fraser, and not Mr. Thornhill, who by an erroneous estimate misled the Government of Madras originally as to the return to be obtained from the Madras Water Works Project, I am directed to draw your attention to the last paragraph of this office letter No. 768-I. of the 9th September last, and to repeat the request that the Government of India may be furnished with a *complete* copy of the correspondence (including the Special Committee's Report) which accompanied Colonel Carpendale's letter No. 2,172 of the 23rd August 1871, submitting the revised scheme for sanction.

2. I am also to inquire whether any, and if so what, notice has been taken by the Government of Madras of Mr. Fraser's error above mentioned.

No. 343. From the Superintending Engineer, 3rd Division, to the Secretary to Government, Public Works Department, dated Bellary, 30th November 1872, No. 2,011.

I HAVE the honour to enclose a letter from Mr. Fraser, C.E., Executive Engineer of Bellary, requesting that certain correspondence regarding the Red Hill Lake enlargement may be furnished to him.

No. 581, dated 28th November 1872.

From W. FRASER, Esq., C.E., Executive Engineer in charge of Bellary Range, to the Superintending Engineer, 3rd Division, dated Bellary, 28th November 1872, No. 581.

MY attention has been drawn to a paragraph in the *Madras Athenæum and Daily News* of the 12th instant, in which allusion is made to some correspondence between the Supreme and Madras Governments regarding the Madras Water Works.

2. The question discussed appears to be *by whom were the Madras Government misled* regarding the profitable return from the storage works, that is, the area of land and the probable quantity of water available for irrigation.

3. From the article in question it seems that, eventually, the Madras Government arrived at the conclusion that they had been misled by the statements in my report.

4. As I consider this conclusion unjust towards me, and as I am desirous of placing the facts in my defence before the Government, I have the honour to request that you will be good enough to obtain for me a copy of the correspondence referred to.

No. 312.

No. 344. *Note by the Chief Engineer for Irrigation.*

MR. W. FRASER having seen in the *Athenæum and Daily News* of the 12th ultimo an article on the Madras Water Works Project, in which it is stated that the Government were misled relative to the probable returns from that project by him, has applied for a copy of the correspondence to enable him to place the facts before Government.

2. The part of the article in the *Athenæum and Daily News* to which Mr. Fraser refers is an exact re-production of paragraph 2 of the letter No. 2,521, dated 25th October last, to the Government of India, and that Officer is therein stated to have misled this Government on two points, namely, as to the probable return from new lands to be brought under irrigation, and as to the quantity of water likely to be available for irrigation.

3. Mr. Fraser's statement on the first point is contained in the last part of paragraph 20 of his report, printed in Proceedings, Madras Government, of the 11th April 1866, No. 1,102, and it runs thus :—" The general difference between the assessment on dry and wet cultivation in the vicinity of Madras is 5 Rupees an acre, but as the land to which this water could be applied pays nothing now, we may take the increase at 7 Rupees an acre, which on 8,571 acres would amount to nearly 60,000 Rupees a year." He goes on to say " if this calculation is even nearly correct, the return on the irrigation part of the project alone would yield a fair percentage on the entire amount proposed to be expended." Upon what information Mr. Fraser based his remark that 5 Rupees an acre is the " general difference between the assessment on dry and wet cultivation" is not apparent from the papers, but it would seem that he supposed that the anticipated revenue returns would be subjected to examination in detail, and confessedly the area he expected to irrigate was defined merely as a portion of the large extent of waste lands known to be commanded by the proposed reservoirs, so that his argument could at best have been founded only on analogy.

4. The Government unfortunately appear to have mistaken Mr. Fraser's assumption for an ascertained fact; paragraph 7 of the Order on the report accepts the calculations given in the latter; and, in paragraph 6 of the letter No. 1,376 of the 30th April 1866, to the Government of India, they speak of the waste land to be irrigated as being " susceptible of being improved to yield an assessment which, though calculated by Mr. Fraser at 7 Rupees, may, in the opinion of this Government, range considerably higher, owing to the proximity of the lands to the Presidency."

5. So far as I am able to judge Government were misled on this point, not so much, if at all, by Mr. Fraser, as by the geographical position of the land which, until quite a recent date, it was thought might properly be assessed at a high rate. It was, indeed, only after an accurate investigation made by the Director of Revenue Settlement that the real circumstances of the land were discovered, and it became known that, notwithstanding its proximity to the Madras market, it would bear but a very low, instead of an exceptionally high, rate of assessment.

6. There is a remark in Mr. Fraser's report which is apparently much at variance with the opinion of the Committee. He says (paragraph 19 of the report) " most of the waste lands under these lakes is of an unusually fruitful character, being, for the most part, alluvial deposit." The Committee, on the other hand, allude* to " the poverty of the soil," and again at the end of paragraph 11 they say, " The apparent leniency (referring to low average rate of assessment) is readily accounted for by there being no really good regada or other rich lands to take into account."

* Report, Proceedings, Madras Government, 23rd August 1871, paragraph 9.

7. The second point on which Mr. Fraser is deemed to have misled the Government is the quantity of water likely to be available for irrigation. There have been many opinions on this subject; the data have all along been, and still are, very imperfect, and there is nothing better than opinions, or deductions from

insufficient data, even now available. Comparing, however, Mr. Fraser's calculations, which will be found in paragraph 18 of his report, with the latest conclusions, namely, those contained in the report of the Committee and its Appendix A, the following results will be exhibited.

8. Mr. Fraser estimated that the lakes would hold in round numbers 138½ millions of cubic yards, and, on the one hand, he intimated that he did not take credit for any additional supplies, which undoubtedly would be received, nor, on the other hand, did he make any deduction for evaporation and absorption. He showed, moreover, that deducting the water to which existing cultivators under the tanks had a claim, there would remain 93⅓ or 114 millions of cubic yards, according as that claim was taken to include the average supply received, or the maximum retainable, by the unimproved reservoirs, and then he assumed that 100 millions might be safely taken as the quantity to be disposed of; allotting 40 millions to the supply of Madras, the remaining 60 millions were supposed to be available for the extension of irrigation. Turning now to the report of the Committee and its appendix, it will be seen that the late Major Ryves made his calculations in a somewhat different manner. He thinks that the tanks may receive and store in such a season as 1870, the only year for which a detailed record of the freshes was in existence, 200 millions of cubic yards between June and December; but, on the supposition that the freshes of that year were more than usually favourable, he takes 160 millions as the quantity likely to be stored, and from this he deducts 45 millions for evaporation and 32 millions for town supply, leaving 83 millions for existing and prospective irrigation. He allows 7,545½ cubic yards per acre instead of the 7,000 allowed by Mr. Fraser, both allowances being hypothetical; and, making this allowance on 4,980 acres of existing cultivation the balance available for extension of irrigation becomes 45 millions of cubic yards against Mr. Fraser's 60 millions. Now, the area of the two lakes when quite full is about 32 millions of square yards, and so the above allowance of 45 millions of cubic yards for evaporation is at the rate of nearly 1½ yards in depth over the maximum area. During a considerable part of the irrigation season, however, the diurnal loss by evaporation would be more than compensated for by rainfall and local drainage, so that it is perhaps more than probable that Major Ryves' deduction is in excess of what is necessary. At any rate there would seem to be nothing misleading in Mr. Fraser's calculations of quantity. His views of the capability of the Cortiliar to fill the tanks has so far been confirmed, for there has been no want of water hitherto; the rest depends upon the special circumstances of the season, and no one can accurately estimate the details upon which the quantity of irrigation water will depend without far more information in the shape of records of supply received, amount of loss by evaporation, rainfall, etc., than is at present, or indeed is likely to be, available.

9. I may notice in conclusion that the full level of the water in the Cholaveram tank has been fixed* for the present at 1 yard below Mr. Fraser's limit, or 5 yards above the old calingulah crest level, the reason being that the change in the arrangements for crossing the Boosykal valley by a single bank and weir, instead of a double bank and aqueduct, caused the flooding of valuable lands, and it was thought advisable therefore to reduce this submergence to a minimum by lowering the full supply level in the reservoir. This alteration reduced the capacity of the reservoir by about 8 millions of cubic yards, and of this Mr. Fraser, of course, had no knowledge, while it is uncertain, and unascertainable from his memorandum, whether Major Ryves was acquainted with this fact.

* *Vide* paragraph 7, Clause 12 of the Executive Engineer's letter No. 1, dated 1st January 1870, printed in Proceedings, Madras Government, 26th April 1870, No. 1,100.

FORT ST. GEORGE. (Signed) J. MULLINS, Lieut.-Colonel, R.E.,
11*th December* 1872. *Chief Engineer for Irrigation.*

No. 345. ORDER THEREON, 18th January 1873, No. 171.

IRRIGATION, No. 28.

ON a further consideration of the circumstances attending the first approval of the Madras Water Works Project as

submitted by Mr. W. Fraser, the Special Executive Engineer employed on its preparation, the Right Honourable the Governor in Council is of opinion that that Officer cannot be held responsible for the difference which has been found to exist between the rate of assessment on waste lands under the tanks as at first estimated, and that which, after investigation, it has been deemed practicable to impose. Mr. Fraser's assumed rate has been shown to be incorrect, but as he was no authority on this particular subject, and as he manifestly did not expect the Government to accept his calculations without these being first confirmed by the Revenue Officers, the Government (who omitted thus to verify them) were themselves responsible for the erroneous estimate of the financial value of the project, on which their recommendation for its sanction by the Government of India was based.

2. The Government are likewise of opinion that Mr. Fraser's estimate of the quantity of water likely to be available for the extension of irrigation was as accurate as could reasonably have been expected, taking into account the data available, which data were clearly set forth in his report.

3. The Government of India will be informed of the conclusions at which His Excellency in Council has now arrived, and His Grace the Secretary of State for India will also be addressed on this subject.

(Signed) J. MULLINS, Lieut.-Colonel, R.E.,
Joint Secretary to Government.

No. 346. From the Secretary to the Government of Fort St. George, Public Works Department, to the Secretary to the Government of India, P.W.D., dated 18th January 1873, No. 172.

IRRIGATION, No. 29-30.

SIR,—I am directed, with reference to the Acting Joint Secretary's letter No. 2,521, dated 25th October 1872, and, in reply to the Assistant Secretary's letter No. 1,021-I. of the 28th ultimo, to transmit, for the information of the Right Honourable the Governor-General in Council, a copy of the order as per margin on the subject of the erroneous estimate of the anticipated returns from the Madras Water Works Project, which was laid before the Government of India when this project was first submitted for sanction in 1866.

Letter No. 1,376, dated 30th April 1866.

2. I am further to express the great regret of this Government that, in the first instance, the revenue side of the question was not fully examined, and that the geographical position of the land was, as it really appears to have been, assumed to render certain the reasonableness of a rate of assessment, which has since been shown to be so greatly in excess of that which can with fairness be levied.

3. His Excellency in Council, I am to say, is sorry, that, when the Government of India called for information as to the incidence of the responsibility for the incorrectness of the opinions expressed with regard to this project, the real character of Mr. Fraser's calculations of returns was not rightly apprehended.

4. It may be here noticed that, at the time the Madras Water Works Project was brought forward, there was no one whose special duty it was to examine completely its several bearings and to take care that all requisite information with regard both to its engineering and revenue details was duly obtained and reviewed. This circumstance, while it does not excuse, does in some measure account for the circumstances noticed in this correspondence.

5. The papers called for by the Government of India are herewith transmitted.

Read the following papers :—

No. 356. From the Superintending Engineer, 4th Division, to the Secretary to Government, Public Works Department, dated Madras, 6th November 1872, No. 3,422.

In reply to paragraph 4 of G. O., No. 2,128, of 7th September 1872, I have the honour to state that the adoption of the old form of Progress Report and the submission to the Controller of an extract from the Register of Works in Form B. B. I., from month to month, will afford considerable relief to the Range Officers, while the new form ordered by Government of India entails unnecessary labour, and, as remarked by Lieutenant-Colonel Fischer, affords no better information than the old one.

No. 357. From the Superintending Engineer, 5th Division, to the Secretary to Government, Public Works Department, dated Camp at Salem, 19th September 1872, No. 123.

With reference to the Order of Government of the 7th of September, No. 2,128, I have the honour to state that the new form of Progress Report will entail much additional labour on the Office Establishments, and I therefore recommend that the old form be adhered to.

No. 358. From the Superintending Engineer, 7th Division, to the Secretary to Government, Public Works Department, dated Coimbatore, 24th September 1872, No. 150.

With reference to G. O., No. 2,128, of 7th September 1872, I have the honour to inform you that, under the present system of audit of accounts in the Controller's office, the Superintending Engineer has nothing to do with their preparation or audit, but simply checks the outlay, etc., entered in the copies of the Progress Reports received from the Range Officers for record in his office. I am therefore of opinion that the old form of Progress Report is preferable to the new one (Form 26), and the submission by the Range Officers of extracts from the Register of Works, Form B. B. I. (for the works for which the new form of Progress Report was ordered to be introduced), slightly modified, as proposed in paragraphs 4 and 5 of G. O., No. 1,310, of 14th May, and paragraph 3 of G. O., No. 1,450, of 12th June 1872, will answer every purpose.

No. 359. From the Superintending Engineer, 8th Division, to the Secretary to Government, Public Works Department, dated Madura, 8th November 1872, No. 3,696.

In reference to G. O. of the 7th September 1872, No. 2,128, I have the honour to report that the adoption of the old form of Progress Report, and the submission to the Controller of an extract from the Register of Works (Form B. B. I.), month by month, for the works for which the new form of Progress Report has been ordered, will, in my opinion, relieve the Executive Officers' Establishments considerably, and be sufficient for all practical purposes.

2. In the G. O. quoted the Government call upon Superintending Engineers to report " whether they are of opinion that *their* offices will in any way be relieved by the adoption of the old form of Progress Report, etc." In reply I have the

honour to explain that as Superintending Engineers are not in account with the Controller, they are not affected by the form of Progress Report that may be decided upon by the Government.

No. 359A. From the Officiating Controller of Public Works Accounts, to the Secretary to Government, Public Works Department, dated Fort St. George, 22nd August 1872, No. 1,116.

I HAVE the honour to forward the accompanying copy of a letter* from the Accountant-General, Public Works Department, for the consideration and orders of Government, on the points hereunder adverted to.

* No. 91 I., dated 4th July 1872.

Enclosures.

1 Copy of letter from Accountant-General, Public Works Department, No. 91 I., dated 4th July 1872.
1 Do. do. from do. do. No. 1,432 G., dated 12th August 1872.
1 Do. do. to do. do. No. 1,117, dated 22nd August 1872.
1 Copy of Circular No. 15 of 23rd April 1872.
1 Copy of Forms.

† Submitted to Government, with Controller's letter No. 3,190, dated 27th March 1872.

2. In the first place I have to remark that the forms (22 and 24) of Cash and Stock Accounts Current introduced in the Accountant-General's Circular† No. 6 of the 13th March 1872, were designed for entirely Irrigation charges, and in paragraph 4 of that Officer's letter, No. 384 G., 22nd March 1872, it is stated "for *purely Irrigation* Divisions, separate accounts will, of course, be rendered." It was therefore reported to Government in Mr. Brock's letter No. 553 of the 3rd June 1872, that inasmuch as there were no ranges in this Presidency constituted as purely Irrigation Divisions, the forms were not adapted to it.

3. In paragraph 8 of the communication from Colonel O'Connell now submitted to Government, I am instructed to have these forms used in all divisions which have been classed as "Irrigation," according to the principle defined in his letter of the 22nd March last, No. 384 G. If this be authorized by Government it will also be necessary to require these Irrigation Divisions to adopt the new form (No. 26) of Progress Report prescribed by the Accountant-General for Irrigation charges. Instead of having one form of Progress Report for Irrigation Divisions, and another for those classed as Provincial and Imperial, it would, in my opinion, be far preferable to sanction the general adoption of the Accountant-General's form in all ranges. There are Irrigation works in the majority of ranges, and as the Accountant-General requires the expenditure thereon to be classified in the accounts forwarded from this office under specific heads, it is necessary that the accounts submitted by Range Officers should afford such particulars as will enable this office to work up to those heads. It requires local knowledge to discriminate and arrange the works under the heads in question, and therefore the Accountants of this establishment will not be in a position to do this if the Irrigation expenditure be recorded in the present form of Progress Report.

4. I must, however, point out that besides the extra columns provided in the revised form of Progress Report for Irrigation expenditure, there are other deviations from the method in which the entries of work executed are at present made regarding which I have received a letter* from the Accountant-General, Public Works Department, copy of which, and of my reply thereto, is herewith forwarded.

* No. 1,432 G, dated 12th August 1872.

5. The Government remark in paragraph 4 of their Orders, No. 1,310, dated 14th May 1872, that the adoption of the new forms will undoubtedly increase the work of the offices of Executive Engineers. While admitting that this will be the case, I have to observe that the requirements of the Government of India, as regards the forms and details in which the Irrigation Accounts are to be prepared, are such that extra labour must be performed in some one branch of the department. The establishment of this office is hardly able to cope with the duties required of it at this time, and the compilation of the accounts, especially under the recent changes ordered by the Accountant-General, Public Works Department, in connection with the separate accounts and books to be made out for the Irrigation Department, distinct from the Provincial and Imperial transactions of the State, occupies so much more time, that we have fallen a little back in the date on which the monthly accounts are usually despatched. Additional abstracts have to be prepared and extra or auxiliary journals maintained, which necessarily take up more time. So far as I can see for the present, this office cannot relieve the offices of Executive Engineers in the way of compilation. What is wanted seems to me an efficient and intelligent Account Establishment in each district, able to thoroughly understand the instructions and form issued from this office, who can put together the accounts of the disbursing officers in each district in correct details for submission to the Controller, giving the Executive Officers less occasion for attention to accounts, and leaving them more free to look after their professional duties, and it will also be the means of concentrating the accounts received in this office. The details now given in eighty-three different accounts will then be embodied in twenty-one. A sketch of the arrangements I consider would meet the requirements of the case is contained in the accompanying letter addressed by me to the Accountant-General, Public Works Department. If some such plan is not pursued I see no other alternative than a considerable increase of cost in consequence of the additional strength which will certainly be required by this office, and probably by those Range Offices where the Irrigation expenditure is heavy.

6. I have also to submit, for the information of Government, copy of Circular from the Accountant-General, Public Works Department, No. 15, dated 23rd April 1872, and of the forms which accompanied it. As these forms cannot be completely written up unless the details of expenditure on Irrigation works are furnished in the new form of Progress Report, and other particulars afforded to this office in respect to the apportionment of the suspense balances* and the opening capital outlay to be charged to each work. The Irrigation Books of this office are not in that state of completeness which is to be desired, and I regret to state that it is practically impossible for this office, with its present strength, to keep up these books in addition to their other duties. Hitherto, transactions of the Irrigation branch have been exhibited under *two heads*† of account in the Public Works Books, but now they have been enlarged into an entirely new set of books comprising journals, sub-journals, and ledgers with twenty-seven different heads of account.

7. Under those circumstances, the orders of Government are now requested for the guidance of this office.

* Interest.
Stock Purchase and Sales.
Stock.
Miscellaneous Advances, etc.

† "Agricultural" for expenditure. "Irrigation Revenue" for receipts.

From the Accountant-General, Public Works Department, to the Controller of Public Works Accounts, Madras, dated Simla, 4th July 1872, No. 91-I.

I HAVE the honour to acknowledge receipt of your letters noted in the margin, forwarding copies of the Proceedings of the Madras Government, in the matter of the preparation of statements showing the financial results from Irrigation works, and the introduction of the forms of account issued with this Office Circular Nos. 6 and 15 of 1872.

No. 363, dated 7th May 1872.
,, 554 ,, 3rd June ,,

2. With regard to paragraph 7* of the Madras Government Order, No. 1,310, dated 14th May 1872, I have to inform you that it is expected that orders will shortly be issued by the Government of India as to the manner of dealing with revenue properly due to Irrigation works, but realized with the Land Revenue in a consolidated form. But in the meanwhile you should not bring any portion of the revenue realized in the Civil Department into your accounts.

* As the revenue is "not collected by the members of the Public Works Department the receipts from Irrigation, whether in the form of water-rate or in the form of a consolidated tax on irrigated land, can be entered in the accounts current only at the end of the year, from information furnished by the Revenue Department."

3. In the second paragraph of your letter, No. 554, dated 3rd June 1872, you state that it is not practicable to separate the cash balances of the Irrigation Department from those of the Imperial, Provincial, and Local Funds, as there is not one range or division in Madras exclusively Irrigational. You, however, accept the principle laid down in paragraph 4 of this office letter, No. 384 G. dated 23rd March 1872, in regard to the classification of mixed division, namely, "if the bulk of the expenditure is Irrigation the division should be classed as Irrigation ; if the outlay is greater under either of the other heads† it should be classified accordingly. You then continue, on the same principle the closing balance of cash, stock, etc., will be distributed over Irrigation, Imperial, and Provincial in the final accounts of the year, but they cannot be worked up to separately during the year."

† Imperial or Provincial.

4. Now, the principle laid down by this office (above quoted), and to which you agree, and your subsequent remarks, seem to me to be somewhat opposed to each other, and I would therefore explain that if any division is classed as "Irrigation," the whole of the cash, stock, and suspense balance of such division should be held to be Irrigation, expenditure on other works being treated as "Transfers" from Irrigation funds, as illustrated in the forms issued with my Circular No. 15 of 1872. Further, as regards the suspense accounts of any one division, I would point out that the forms provide for those accounts being kept separate for each canal, project or set of works authorized to be dealt with together, as also for ordinary agricultural works for which no Capital or Revenue Account is kept ; and if this separation be not attended to it will be impossible to make correct charges for interest. Your remark above quoted on this subject appears to be based upon the latter portion of paragraph 7 of this office letter, No. 384 G of 1872, but I would explain that that portion of my letter refers to the transactions and books of the Public Works Department proper only, and not to Irrigation Accounts. If the instructions given in my letter quoted above are carefully examined, it will be clearly seen that the distribution of the balances between Imperial Provincial and Irrigation will only have to be made *in the closing accounts of the past year*, a step rendered necessary by the new classification. In the accounts of the current year all the balances in those divisions that may have been, or will be, classified as Irrigation division will remain Irrigation balances as long as the divisions remain Irrigation. In such divisions no distribution of balances whatever will be requisite at the close of the year. The whole of the balances will be Irrigation and will be separately accounted for in the new Irrigation accounts.

5. At the conclusion of paragraph 7 of my letter previously quoted, it is explained that in mixed divisions accounting for Provincial and Imperial outlay, the balance would have to be separated between "Imperial" and "Provincial" at the close of the year, but Irrigation is entirely excluded from this ruling.

6. In reply to the 3rd* paragraph of your letter No. 554, I have to observe that the *whole* of the balances of the suspense accounts of any project for which Capital and Revenue Accounts are kept will for the present have to be charged to *Capital*, as shown in the forms. This account receiving credit for expenditure of stock on Revenue works by a reduction of the stock balance, and a similar course should be followed in connection with the other suspense accounts referred to. As regards the balances of these accounts appertaining to works for which no *Capital or Revenue* Account is kept, I would point out that special provision has been made in the forms for them, *vide* entries under "Sundries Dr. to Sundries for opening balances," at the top of page 2, Irrigation Journal for the whole Province, and Controller's Ledger, Accounts Nos. 18, 19, and 21.

* It is laid down " that the balances of 'Stock' 'Stock purchases' and Miscellaneous advances, should be debited to the *Capital Account* of the several projects concerned, but should any portion of these balances appertain to works chargeable to Revenue, or to those for which *no Capital or Revenue Accounts are kept*, it is not shown to what heads they are debitable in the opening entries."

7. With reference to your 4th paragraph, I would explain that these will not be an Account *Budget Grant* in your Irrigation Books, and therefore the balances of the Suspense Accounts cannot be *charged* to such a head.

8. In your 5th paragraph you say that the forms Nos. 22 and 24 (Executive Engineer's cash and stock accounts current) are inapplicable in Madras, and that you have informed the Local Government accordingly. On this matter I would observe that the forms in question are to be used in all divisions which have been classed as Irrigation, according to the principle accepted by you in your 2nd paragraph.

9. Finally, I have to request that you will use your utmost endeavours to introduce the new forms of account as far as possible in the divisions noted in paragraph 6 of the Order of the Government of Madras, No. 1,310, dated 14th May 1872. On receiving further orders from the Local Government as to the division of the several districts into circles, it will probably be found that several of such circles may also be fairly classed as Irrigation Divisions or ranges in conformity with paragraph 4 of this office letter, No. 384 G., dated 23rd March 1872.

From the Accountant-General, Public Works Department, to the Controller of Public Works Accounts, Madras, dated Simla, 12th August 1872, No. 1,432-G.

The Government of India having forwarded to me for report a letter from the Government of Madras representing the difficulty experienced in the preparation by the Controller of the Schedule of Rates required from the Madras Presidency, I have the honour to request that you will state at length wherein that difficulty exists.

2. Among the papers forwarded is one from your office to the Secretary to the Government of Madras, No. 2,300, dated 11th December 1871, wherein the following remarks are recorded :—

"The Monthly Progress Reports in use in this Presidency take the place of the schedules (Form No. 26, accompanying the Government of India Code,) furnished by divisional officers serving in the Provinces more immediately under the Supreme Government. On comparing the Return in use in Bengal with the Madras Progress Report, modified by G. O., No. 216, dated 22nd January 1867, which directs the exclusion therefrom of the details of all works executed up to the close of the month preceding that to which the report refers, it will be seen that, while the former contrasts month by month the sub-heads of estimate with the actual cost of work performed up to date under those sub-heads, the latter contains nothing more than details of the expenditure in the month, and as all the estimates sanctioned for execution are not on record in this office and no Work Registers are maintained, a check upon rate is impracticable."

3. If this describes the state of things exactly it would appear that the Madras accounts are prepared, so far as rates are concerned, in the reverse way from those prescribed in the Public Works Code. By that Code the rates of work done up to date are shown in the accounts, whereas in Madras the rates of the month are only shown. I would be glad to receive an expression of your opinion as to whether this is satisfactory, and if it affords the means for applying the requisite check to the expenditure incurred.

4. With your reply the complete accounts of an *average* range for any one month which may not be required for reference in your office should be forwarded.

From the Officiating Controller of Public Works Accounts, Madras, to the Accountant-General, Public Works Department, Simla, dated Fort St. George, 23rd August 1872, No. 1,117.

In reply to your letter, No. 1,432, dated 12th August 1872, I have the honour to state that, being only temporarily attached to this office to officiate during the absence of the permanent incumbent, I feel some delicacy in submitting my opinion regarding the difficulties and arrangements referred to in your letter. However, as the re-organization of the department is under consideration, and you have called upon me for an expression of opinion, I cannot defer complying with your orders. I have therefore to inform you that the difficulty experienced in this office in the compilation of the Schedule of Rates arises chiefly from the fact that it has not been considered the duty of the Controller to supervise the rates at which works of various kinds are being executed, consequently in many cases they are not regularly returned month by month for works the estimates for which exceed Rupees 2,500. Even if these returns had been made they would have been of little use, in so far that any regular comparison with the sanctioned rate would not have been possible, in the absence of the abstracts of the sanctioned estimates. So-called abstract estimates are sometimes submitted, but most of them are in too great detail to be serviceable for the purposes of the schedule of receipts and expenditure in which each kind of work at varying rates should as a rule only occupy a single line.

2. In fact, the only check possible, with the accounts as at present submitted, is that of the total expenditure against the totals of estimate and appropriation. It necessarily results that when further information is called for it has to be obtained by reference to the Executive Officers.

3. Much of the difficulty in the matter of accounts both of the Range Officers and those of the Central Office, in my humble opinion, arises from the great number of ranges being treated as separate divisions, in consequence of which the establishments required for the account work are so largely sub-divided both in numbers and pay as to become comparatively inefficient as Account Offices. The remedy for this, in my opinion, is to treat ranges as sub-divisions; the Range Officers only submitting to the District (or Divisional) Office the accounts required from Sub-Divisional Officers, the Range Officer being held responsible that these are forwarded complete in every way so as to avoid after reference. By providing the District Offices with an *efficient* Account Establishment (from the savings effected on the Range Offices) the accounts required from each Divisional Executive Officer for submission to the Central Office can easily be compiled.

4. This arrangement, while it would concentrate the account work, would not only not interfere with the Executive Officers, but actually leave them more free for their duties of supervision and inspection, and in the case of District Engineers would supply them with the complete control over their subordinate's proceedings obtained by a full knowledge of their monetary transactions, without seriously interfering with their inspection duties. The pay of the Head Accountants of the District Offices should be such as to secure really efficient men.

5. The Accountants of these Offices, together with those in the Central Office, might be graded, and their pay made to rise by small annual increments, as in the case of those attached to other Provinces.

6. The effect of these arrangements on the Central Office would be that the number of divisions being decreased, the booking work would be much more limited and the time of the establishment thus saved be devoted to that more close check which I consider most necessary, not only in the interests of Government, but of the officers themselves.

7. From what I have said it will be seen that I do not consider the present arrangements satisfactory, but I think it is more the fault of the system than that of individuals.

8. With reference to your No. 91, dated 4th July 1872, on this subject, I enclose a copy of a letter I have addressed to the Madras Government.

9. Two sets* of Range Accounts are forwarded by book post as requested in your paragraph 4.

* Eastern Delta Range, Godavery, February 1872.
Salem Range, February 1872.

No. 360. From the Controller of Public Works Accounts, to the Secretary to Government, Public Works Department, dated Fort. St. George, 24th September 1872, No. 1,390.

I HAVE the honour to acknowledge the receipt of the Proceedings of Government of the 7th instant, No. 2,128, wherein I am requested to state any objections that I may wish to raise against the arrangement proposed in paragraph 4, whereby this Office, in lieu of the details provided for in the new form of Progress Report, will be furnished with Progress Reports in the old form, and a monthly extract from the Registers of Works comparing the outlay up to date with the provision under the sub-heads of sanctioned estimates.

Two Lists.

2. In reply I beg respectfully to invite the attention of Government to Captain Trail's letter of the 22nd ultimo,* which is still under consideration, and to state that my reply to the inquiry made in the order under acknowledgment must necessarily depend upon the decision which is arrived at in regard to the extent to which the new forms prescribed by the Accountant-General of the Public Works Department are to be adopted in this Presidency. If those forms are to be extended to *all* ranges, as recommended by Captain Trail, the arrangement proposed by Government will, I think, sufficiently meet the necessities of the case, so far as regards the irrigation works of magnitude detailed in the margin of paragraph 6 of Proceedings of the 14th May last, No. 1,310, *always provided that the expenditure is classified, and the charges distributed according to Form No.* 26; but if, on the other hand, the new forms are to be of general application, it would, for many reasons, be desirable to adhere to them as closely as possible, so as to ensure complete uniformity between the accounts rendered to this Office and other Controllers by Divisional or Range Establishments.

* No. 1,116

3. Captain Trail has already brought to notice the great difficulties under which this office labours in meeting the growing demands which are made upon it. The requisitions from the Public Works Accountant-General alone take up a considerable portion of the time of this establishment, which every one admits to be unequal to the work devolving upon it, and the enclosed lists of papers,* showing the calls made upon this department from the officer in question during the periods noted in the margin, will sufficiently indicate how large an increase of work has arisen from a single quarter.

* Already sent to the Accountant-General, Public Works Department, with a special representation.

From the 1st April to 31st October 1868.
" " " " " 1871.

4. Now that new forms of Irrigation Accounts have to be rendered, extra books maintained, and additional abstracts prepared, it is found absolutely impossible to render the monthly accounts with the same regularity as in former years. In 1871-72, the accounts for April 1871 were rendered on the 23rd June, those for May, June, and July being despatched on the 13th July, 15th August

and 16th September respectively. This year, however, owing to changes recently introduced in the forms of account, and to the heavier work devolving upon this office, the accounts for April 1872 were not forwarded to the Accountant-General till the 12th and 18th July, those for May having been despatched on the 29th August, while the accounts for June are still incomplete. I cannot but view this falling off with great anxiety, and, in now representing the matter to Government, I respectfully request their permission to submit a scheme for the re-organization of this establishment, and for placing it on such a footing as will enable it, on the one hand, to secure the timely examination and despatch of the monthly accounts, without interfering with the regular ordinary work of the office, and, on the other, to attend to the numerous calls of an extraordinary character which are made upon it. The work of the salary Branch occupies most of the time of the Deputy Controller, who, in addition, has to assist in the general work of the office, and to help in the examination of Range Offices. Now that so much undivided attention has to be given to the Irrigation Accounts, it seems absolutely necessary, to carry out the original intention of the Government of India, and to strengthen this department by the appointment of an additional officer, whose duty it will be, under the general directions of the Controller, and in communication with the Chief Engineer for Irrigation, to see that the Accounts of Irrigation Works are properly started, and that the requirements of the rules in respect of those accounts are fully met.

No. 361. From the Controller of Public Works Accounts, to the Acting Chief Engineer for Irrigation, dated Fort St. George, 5th October 1872, No. 1,508.

I HAVE the honour to acknowledge the receipt of your letter No. 199 of the 23rd ultimo, in which you call for an expression of my opinion on the points raised by the Accountant-General of the Public Works Department in his letters of the 4th July and 12th August last, Nos. 91-I and 1,432-G, respectively.

2. In reply, I have to state, with reference to the second of these communications, that the Controller of Public Works Accounts in this Presidency has never been required to exercise a check over rates, or to compare expenditure with the provision under the sub-heads of sanctioned estimates. Hence, it happened that the form of Progress Report originally sanctioned for adoption in this Presidency was so far modified in G. O., No. 216, dated 22nd January 1867, that, instead of being required to show the details of outlay on each work *up to the close of the month* for which the return is rendered, the entries of expenditure were ordered to be restricted to the outlay *of the month.*

3. The Madras Government have always held that the required check in respect of details of outlay should be exercised by Range Officers and Superintending Engineers, and the Controller is therefore never in a position to furnish such particulars, when called for, without a previous reference to the local officers. As this Government are opposed to the suggestion that the Controller should check the rates at which work is being done, and consider that that officer's duty should

be confined to seeing that *estimates and allotments in the aggregate* are not exceeded, the Progress Report,* in the form in which it has heretofore been rendered, answers all purposes, but this office has, of course, no information from which to compile the Schedules of Rates referred to in Colonel O'Connell's letter, and which this Government have accordingly instructed Superintending Engineers to prepare and forward to the Chief Engineer for compilation and submission to the Government of India.

* For works other than those for which Capital and Revenue Accounts are kept.

4. Under the re-distribution of ranges sanctioned in the Order of the 1st July last, No. 1,586, there will be seventy† separate officers in account with the Controller. Each of these renders a monthly schedule of expenditure or Progress Report, and if the returns are required to show details such as are given in the Provinces more immediately under the Government of India, the work of Range Establishments will be very largely increased, and this office cannot possibly control outlay, in the sense of checking rates in comparison with sanctioned estimates, without a very considerable augmentation of its strength. Even with such an augmentation it appears to me that the check would practically have to be exercised by Divisional Accountants and Auditors, for with the large number of schedules that will be received, the heavy current work, the absence of the Controller and his Deputy on inspection duties, it will, in my opinion, never be possible for the officer at the head of the Accounts Branch to take upon himself the examination of the returns without seriously interfering with other and important duties. Under the arrangements in force here, no difficulty need be felt in checking rates by means of the professional staff at the disposal of Government, each Superintending Engineer's charge being far more limited than that of the Controller, and as these officers will shortly be superseded by District Engineers, whose attention will be confined, in each case, to a single district, the facilities for controlling outlay by their agency will be very greatly increased, and no danger need, I think, then be apprehended of irregular outlay, or outlay in excess of sanctioned estimates, being incurred without immediate detection.

† Including Presidency, Bangalore, Neilgherry, Public Works Stores, and the two Government Workshops.

5. In order to reduce to a minimum the difficulties and disadvantages under which this Office labours consequent on the large number of ranges, it has been suggested that those in charge be treated as Sub-divisional Officers, District Engineers, like Executive Engineers in Bengal, being regarded as the only officers directly in account with this office. This arrangement, on first consideration, would seem to be good and feasible, but from what I have urged further on in this letter, I think you will agree with me that it could not be carried out without affecting the very constitution of the Madras Public Works Department, and seriously interfering with its efficiency.

6. Adverting to the earlier of the Accountant-General's letters, namely, that dated 4th July last, I beg to observe that if this office is required to write up its books in the forms furnished with that officer's Circular No. 15, dated 23rd April last, it will be necessary for Range Officers to render their schedules or Progress Reports in Form No. 26 accompanying Captain Filgate's Circular of the 13th March, No. 6. On examination of the form of sub-journal to be maintained here under the

new system, and a comparison of that form with Form No. 26 just quoted, will show that the former is worked up from the latter, and that in the absence of details (Form No. 26) both in the classification and distribution of outlay, it will be absolutely impracticable to write up the sub-journals. According to the last orders passed by Government (No. 1,310, dated 14th May 1872,) the new form of Progress Report has to be adopted for the works as per margin, but when the grouping of the Irrigation works in the several districts, ordered in Proceedings, No. 1,102, dated 30th April 1872, has been carried out, and the works for which Capital and Revenue Accounts can be prepared have been decided upon, the use of the new form will probably be very greatly extended, and will, it is believed, embrace, if not all, at least a very large portion of the Irrigation works of this Presidency. Form No. 26 provides for expenditure being recorded as follows:—

Godavery Delta.
Kistna do.
Pennair do.
Palar Anicut.
Streevygoontum Anicut.
Upper Coleroon do.
Chembrumbaukum Tank.
Madras Water Supply Project.

1*st*.—On Ordinary and Extraordinary Agricultural Works for which Capital and Revenue Accounts are maintained.

2*nd*.—On Ordinary Agricultural Works for which no Capital or Revenue Account is kept.

Under the first of these heads, the outlay has to be given in great detail, and to be classified and distributed. As regards the second, the expenditure is recorded much after the form of the Ordinary Progress Report.

7. The new form is now used only for the works marginally noted above, and until final orders are passed on the subject of G. O., No. 1,102, dated 30th April 1872, the old form of Progress Report, to include all other irrigation works and works classed under the following heads, must be continued:—

Imperial, Provincial, and Local. {
Military,
Civil Buildings,
Communications,
Miscellaneous Public Improvement.

8. The Accountant-General requires the adoption here of the principle defined in paragraph 3 of his letter, namely, that all ranges in which the bulk of the expenditure is on Agricultural works should be classed as "Irrigation." Following these instructions, it will be necessary to treat the undermentioned charges as "Irrigation" Divisions, and to require from them cash and stock accounts current in Forms Nos. 22 and 24.

Golcondah.	East Coast Canal.
Eastern Delta, Godavery.	Chembrumbaukum.
Western Delta, do.	Poloor.
Eastern Delta, Kistna.	Virdachellum.
Western Delta, do.	Tanjore.
Nellore.	Vuppoor.
Pullumpett.	Southern, Tinnevelly.

9. The classification of these ranges as "Irrigation" has been made after an examination of the actual outlay of 1871-72, which showed a higher expenditure on agricultural works. Some of these ranges are, however, to be amalgamated with others, and such amalgamation may have the effect of excluding the new

ranges from the proposed classification. As regards others, it is just possible that the actuals of this year may show a larger expenditure under Imperial (not Irrigation) or Provincial, and in the case of some of those now classed under one or other of these latter heads, it may happen that the bulk of the current year's outlay may be on Irrigation works. In this manner, constant changes will be necessary, all leading to an increase of labour and complication. We have no purely Irrigation Ranges in Madras, and hence it appears to me that Forms Nos. 22 and 24, while very suitable to some of the divisions under the Government of India, are ill-adapted to this Presidency.

10. Adverting to the reduction of the number of officers in account with the Controller, proposed in Captain Trail's letter, No. 1,116, dated 22nd August 1872, I beg to observe that, regarding the proposal from an account point of view, its adoption would be very desirable, and would greatly reduce the work of compilation in this office.* But there are other, and probably more important, considerations which must not be overlooked in the discussion of this subject. Under the system in operation prior to 1863, District Engineers were in account with the Central Office of Public Works. At that time the system of account was simple, and the number of returns rendered was comparatively few and easy of preparation. Now, however, a far more elaborate and detailed system has been introduced, and the Manual distinctly requires that officers rendering them should be held responsible to the extent indicated in paragraph 83 of Section II.* The almost universal complaint in former days was that District Engineers being required to render accounts, were tied to their desks to the prejudice of their more important professional duties of inspection and supervision. If there were any grounds for this complaint in 1863, the evil will now be considerably enhanced, and the capital object which the Government have in view in the re-appointment of District Engineers will be almost entirely frustrated. Moreover, District Engineers cannot possibly be Public Works disbursers, except in the way of paying their own salaries and the salaries of their office establishments, and no officer is permitted to be in account with the Controller who is not a *bona fide* Public Works disburser. It is a great mistake, I think, to place Madras District Engineers and Executive Engineers in Bengal on the same footing, for while the former are purely administrative officers, the latter are executives, in the general acceptation of the term, controlling outlay in detail, and making direct disbursements for Public Works. The charge of a Madras District Engineer will, ordinarily, comprise from three to five ranges, over which it would be absolutely impossible for him to travel with the speed and frequency which will be necessary to enable him to make timely payments. Under all the circumstances, and with due regard to the highest State interests, it will, in my opinion, be highly injudicious to hamper District Engineers with account work, or to impose duties upon them which would detract from their usefulness as the local administrative officers of the Public Works Department.

* See also paragraphs 1 to 3 of Section I. of Chapter XIX. of the Government of India Code.

11. As matters now stand, the Accountant-General of the Public Works Department requires the maintenance by this office, from the commencement of the current official year, of books recording in detail transactions in connection

with works of Irrigation, but, for reasons of which you are aware, these books cannot be written up until the Controller is in possession of fuller information than is now available in his office. Meanwhile, requisitions for statements and returns are being made by the Accountant-General with which it is impossible to comply, and I therefore earnestly beg that you will have the goodness to move Government to make such a representation to the Government of India as will place that Government in full possession of information regarding the actual state of things in this Presidency, and relieve this office from responsibility for non-compliance with requisitions, in respect to Irrigation outlay and revenue, materials for meeting which are not at present obtainable.

No. 361A. From the Controller of Public Works Accounts, to the Acting Chief Engineer for Irrigation, dated Fort St. George, 8th October 1872, No. 1,521.

1 Copy of letter from Accountant-General, Public Works Department.
1 Do. do. to do.

ADVERTING to the concluding paragraph of my letter No. 1,508, dated 5th instant, I have the honour to forward copy of a letter from the Accountant-General of the Public Works Department, under date the 24th September 1872, No. 1,732, calling for statements of Irrigation revenue and outlay, and transcript of my reply, intimating for reasons explained, my inability to comply with the requisition.

2. You will perceive from these papers that there is some misconception as to the actual state of things in this Presidency in connection with the new Irrigation Accounts ordered to be introduced by the Government of India, and it is for this reason, and in order to prevent disappointment, that I requested you, in my letter of the 5th instant, No. 1,508, to have the goodness to move the Madras Government to make such a representation to the Government of India as will place that Government in possession of full information on the subject.

From the Officiating Accountant-General, Public Works Department, to the Controller of Public Works Accounts, Madras, dated Simla, 24th September 1872, No. 1,732-General.

IN order to enable me to complete certain returns of Public Works receipts and expenditnre which have to be included in the Finance and Revenue Accounts of the Empire, I have the honour to request that you will be good enough to furnish me as early as possible with the three following statements connected with the receipts and outlay on Irrigation Works during 1871-72 and up to end of 1871-72 :—

I.—Capital outlay during 1871-72 and to end of 1871-72 on each Irrigation Project, distinguishing between Ordinary and Extraordinary expenditure.

The return should be prepared in the Form No. II., page 13 of the series of accounts issued with Public Works Department Circular No. 80 of 1871. The increase or decrease in stock balances will of course be shown. The amounts of the other suspense balances—if the latter have been charged to grant in the accounts of 1871-72—should also be given. And the total of "previous outlay" should agree with the totals given in the "Abstract of financial results of Irrigation Works," of which a copy is herewith forwarded. If they do not agree the differences should be explained as far as possible. The figures given for 1871-72 should agree under "Extraordinary" with the amount shown in the Appropriation Account for that year. For ordinary outlay of 1871-72 the amounts and the entries under Revenue, which will be referred to in a subsequent

portion of this letter should likewise agree with the Appropriation Account. The total of the statement will, of course, represent the opening entries of the "Capital outlay" to be brought into your Irrigation Books for 1872-73. If hereafter it is found that that opening amount has to be altered, it can be done by write-back.

The total of the statement which has to be submitted to this office under Clause V., paragraph 2 of my Circular No. 15 of 1872, should, of course, correspond with the total of the statement now called for.

II.—Revenue receipts and expenditure during 1871-72 of each canal.

To be prepared as far as possible in the forms at pages 15 to 17 of the series of accounts issued with Public Works Department Circular No. 80 of 1871.

On the expenditure side of that account it will suffice to divide the outlay under—

I.—Works.
II.—Maintenance and Repairs.
III.—Plantation.
IV.—Compensation.
V.—Establishment, sub-divided into—
Direction.
Account.
Works.
Collection and Police.
Plantation.
VI.—Tools and Plant.

On the receipt side of the account the heads given in the form should be adhered to, but the income should be entered under two heads in the two distinct columns, namely,—

I.—Assessments of year.
II.—Actual receipts during year.

The actual receipts of the entire series of canals should, of course, correspond with the amount shown in your annual accounts. The amounts under expenditure and the corresponding sums charged as ordinary capital outlay and ordinary agricultural expenditure for which no capital or revenue account is kept should, of course, agree with the total Irrigation expenditure of 1871-72, as charged in the Appropriation Account. A memorandum should accompany the statements now called for, showing that this agreement has been effected.

If the amounts of assessments are not known in your office the column may be left blank.

III.—Interest account for each canal to end of 1871-72 prepared according to the form given at page 88 of the Abstract of Financial Results.

IV.—General abstract summing up the results shown in the preceding statements.

This abstract may be in the following form :—

——	Capital outlay.		Revenue receipts and charges of 1871-72.			Net Revenue from each canal to end of 1871-72.	Charge for Interest.		Difference between charge for Interest and Net Revenue.	
	During 1871-72.	To end of 1871-72.	Receipts	Charges.	Net Revenue.		During year.	To end of year.	During year.	To end of year.
Canals in operation. Detail each Canal ...										
Canals under construction. Detail each Canal ...										
Grand Total...										

If the information is obtainable the number of acres of land irrigated during the year by each canal should also be given in the return.

In the columns for Revenue Receipts and Charges for 1871-72 and Net Revenue the "Assessments" where the information is obtainable should be shown in red ink, and the actuals in black ink.

2. The entire series of canals in Madras should be entered in the statements now called for, but if from any cause any of the canals are omitted, a note explanatory of the cause of the omission should be furnished.

3. I am aware that the preparation of these returns will throw additional work on your office. But as the new forms of Irrigation Accounts have been brought into use with effect from the current year only, it is absolutely necessary to require that you should submit the statements now called for, and this should be done as early as possible. On no account should their submission be delayed beyond the 18th of October next.

4 It is known that extreme difficulty will be felt in the compilation of these returns. But the best and most accurate information that can be obtained should be supplied.

From the Controller of Public Works Accounts, Madras, to the Accountant-General, Public Works Department, Simla, dated Fort St. George, 7th October 1872, No. 1,515.

I HAVE the honour to acknowledge the receipt of your letter, No. 1,732, dated 24th September 1872, calling for statements connected with receipts and expenditure on Irrigation Works during, and up to the end of, 1871-72, and to submit the following remarks for your consideration.

2. In the Proceedings* of the local Government forwarded to you with my letter No. 363, dated 7th May last, it was noticed "that the statements of remunerative and reproductive works hitherto submitted related to a few of the more important works, and the results obtained from them do not therefore indicate the financial results from Irrigation Works throughout the Presidency, while the different methods under which the entries under Capital and Revenue have been estimated render the statements almost useless. The Capital Accounts to be opened in Madras must, in a great measure, be arbitrary, as the real cost of existing works, with a few exceptions, cannot now be ascertained; the manner in which the Capital Accounts are to be computed must be determined for each work or group of works after the sub-division of the district into groups has been made." Again, with special reference to the requisition contained in paragraph 2, Clause V. of your Circular No. 15 of the 23rd April 1872, wherein it is stated that, if any difficulty is experienced in obtaining what is wanted for the opening entries of the Capital Account, the matter should be reported to you in view to its being laid before the Government of India for orders, this office forwarded with letter No. 554, dated 3rd June 1872, copy of the Proceedings† of the Madras Government, in which they distinctly record that:—"Until the Districts have been divided into circles, and the information required to admit of the Capital and Revenue Accounts being opened has been obtained, the forms proposed for adoption from the 1st April cannot be opened in their integrity." Further, in respect to the remarks made by you on the details given in the Irrigation Accounts of this office for April 1872, it was explained‡ that the omissions and extra details pointed out were, owing to the works not having yet been arranged by projects and groups, and hence also the incomplete state of the books of this office. Under all the circumstances, the present requisition made upon this office was hardly expected, and cannot possibly be complied with.

* No. 1,102, dated 30th April 1872.

† 1,310, dated 14th May 1872

‡ No. 1,199, dated 29th August 1872.

3 The first requisition is for accounts of Capital outlay during 1871-72 and to end of 1871-72 on *each* Irrigation Project. In the printed abstract of financial results of Irrigation works there are about 30 projects enumerated, while for those only noted in the margin have the local Government ordered the adoption of the new forms of account. As the schedules of expenditure submitted by Executive Engineers do not exhibit the items arranged in such a manner as to bring together the several works connected with particular projects, and as the arrangement of works by projects and groups can be made only by officers possessing local knowledge, it is not practicable for the Controller to discriminate between them, and to work up the outlay of previous years according to the totals given in the printed abstract above referred to. This office has, however, been in communication for some time with Superintending Engineers, in order to obtain details whereby to check the accuracy of the figures in respect to outlay given in that abstract, but, up to date, complete replies have not been received, although several reminders have been sent. It cannot be made out how the ordinary outlay on Capital works and the entries under Revenue can, *of themselves*, be made to agree with the Appropriation Accounts, when the latter includes expenditure on several minor works not classed under the above two heads.

Godavery Delta.
Kistna.
Pennair.
Palar Anicut.
Streeviguntum and Upper Coleroon.
Chembrumbaukum Tank Project.
Madras Water Supply Project.

4. The inability of this office to gather correctly the different items making up particular projects and groups of works, which prevents the making up of the Capital Accounts, presents itself also in the preparation of the returns of revenue and interest. The only revenue receipts from Irrigation works which have been shown in the Public Works Accounts are those realized by tolls on boats and sales of grass on river banks. The other heads of receipts are unknown to this office, while, under the instructions contained in paragraph 2 of your letter, No. 91, dated 4th July 1872, the revenue from water rates, etc., realized in the Civil Department is not required to be brought into the accounts of this office.

No. 362. ORDER THEREON, 20th January 1873, No. 178.

IRRIGATION, No. 31.

THE Government of India having determined to record in a more systematic manner the expenditure on and results from Irrigation works in India, issued for adoption in this Presidency certain forms of Account based on the organization of the Department of the Public Works in the Provinces more immediately under the orders of the Government of India. As the organization of the department in the Madras Presidency and the nature and the extent of the Audit by the Controller of Public Works expenditure differ in many important particulars, it has been represented that certain forms are ill-adapted to the existing arrangements and that certain others will involve so much extra work that an increase of establishment is essential.

2. Assuming the correctness of the Controller's representation that the introduction of the forms in their integrity owing to past practice and present system is impossible, His Excellency the Governor in Council resolves to call on that officer to analyse carefully the forms proposed by the Government of India, and to send forward his own proposals to this Government showing how the information required by the Government of India can best be furnished under the system of organization now proposed, and what modifications, if any, are necessary

in his own office establishments and in those of the Range Officers to enable them to carry out his views. In disposing of the question the Controller will remember that the Madras Government attach the greatest importance to the transfer of all accounts but those that may be termed "prime accounts" to the Central Office of Account, that the disbursing officers may be relieved as far as possible of all compilation other than that necessary for a comparison between a work and its estimate; and that this Government are not disposed to transfer the duty of checking rates of execution of works from the District Officers to the Controller. In submitting his proposal the Controller should state very fully why he considers any of the Government of India forms inapplicable, if he proposes to dispense with them, illustrating his opinion, by submitting a set of the forms in question filled in for any range; and show clearly that with the forms modified to correspond with the practice in this Presidency, the information required by the Government of India will be supplied in a convenient shape.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

Read the following papers :—

No. 373. From the Acting Superintending Engineer, 1st Division, to the Chief Engineer for Irrigation, and Joint Secretary to Government, dated Dowlaishweram, 30th November 1872, No. 3,138.

With reference to paragraph 2 of G. O., No. 2,493, dated 22nd October 1872, I have the honour to inform you that the estimates for Minor New Works therein alluded to were prepared by the Supervisor in charge, Golgondah Range, but submitted to me through the Collector, who requested me to appropriate funds for them. The application for the additional grant Rupees 1,000, to meet the cost of these Minor New Works sanctioned in the above G. O., was made through the Collector by an oversight.

1 Statement of Survey Establishment.

2. Adverting to paragraph 3 of the G. O. under reference, I beg to submit herewith, for the sanction of the Government, a statement of the survey establishment required to be employed for the preparation of surveys, etc., of the Irrigation projects in the Vizagapatam District, prepared in accordance with the instructions therein given.

VIAZAGAPATAM DISTRICT.

Statement showing the Survey Establishment required to be employed for the preparation of Surveys, etc., in connection with Irrigation projects.

—	Particulars of charges.	Rate of monthly pay.	Cost per mensem.	Cost per annum.
		RS.	RS.	RS.
Vizagapatam	1 Surveyor at	75		
	5 Lascars, each at 7 Rs. ...	35		
			110	
				1,100
	Total required...	...	...	1,100

Remarks.—Required for ten months for the preparation of surveys, etc., in connection with Kondakirla, Ava, and Pengole River projects.

Dowlaishweram,
30*th November* 1872.

(Signed) J. F. FISCHER, Lieut.-Colonel, R.E.,
Acting Superintending Engineer, 1st Division.

No. 340.

No. 374. Note *by the Chief Engineer for Irrigation.*

In the absence of definite information as to the kind and amount of work already done and remaining to be done in connection with the Kondakirla, Ava, and Pengole River projects in the Vizagapatam District, I am not at present disposed to recommend the sanction of the survey establishment for a longer period than to the close of the current official year. The District Engineer should in the course of the next two months report exactly how matters may then stand, and what probability there may be of projects likely to be sanctioned being matured, when, if necessary, further sanction can be given.

Fort St. George,
31*st December* 1872.

(Signed) J. MULLINS, Lieut.-Colonel, R.E.,
Chief Engineer for Irrigation.

No. 375. Order thereon, 20th January 1873, No. 183.

IRRIGATION, No. 32.

Pending receipt of the definite information required by the Chief Engineer for Irrigation, and report as to the manner in which the District Engineer proposes to supervise the work of a survey establishment and turn it to a thoroughly practical account in the Vizagapatam District, His Excellency the Governor in Council declines to sanction the expenditure proposed.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

No. 376. Read the following letter from the Superintending Engineer, 3rd Division, to the Secretary to Government, Public Works Department, dated Bellary, 30th November 1872, No. 2,015 :—

WITH reference to G. O., No. 2,782, dated 27th November 1872, I have the honour to report that G. O., No. 535, dated 28th February 1872, has not been lost sight of. I beg to enclose a statement showing the present condition of the tanks above the Railway and measures taken to save them from damage in two ranges.

2. This statement does not include the return of tanks from the Cuddapah Range, Cuddapah District. Mr. Hunter promised me ten days ago to send it, and the statement was kept back pending its receipt. I now forward the list complete only for the Ghooty and Budwail Ranges of the Bellary and Cuddapah Districts. The above return will be submitted by the District Engineer.

Statement showing the state of all Tanks in the 3rd Division which are situated above the line of Railway and whose condition might affect the safety of the Railway, prepared with reference to G. O., No. 535, dated 28th February 1872.

District.	Taluq.	Name of Tank.	Amount of Estimate for its repair.	Present state or condition.	Remarks by Superintending Engineer.
			RS.		
Bellary.	Ghooty ...	Ghooty Tank ...	......	Situated 2 miles south of the Railway line ; has two feeders or supply channels which cross the line under two bridges of four spans each ; ample waterway is provided. The surplus channel leaves the tank at its south-west extremity, and after taking a southerly direction falls into the Pennair river.	
	......	Yerratimarazechervoo.	......	A large tank south of the line of Railway supplied by hill drainage and surplus water from Pathakocheroo tank ; it is in good order and has sufficient discharging capacity. The surplus leaves the tank at its southern extremity, and, flowing in a southerly direction, empties into the Pennair river.	
	......	Pathakochervoo Tank.	......	A small-sized tank fed by hill and local drainage ; the Railway embankment passes through the bed of the tank which is protected by a revetment built along the toe of the bund ; the surplus water is discharged into the Yerratimarazechervoo tank and finds its way ultimately to the Pennair river.	

Statement showing the state of all Tanks in the 3rd Division, etc.—(Continued.)

District.	Taluq.	Name of Tank.	Amount of Estimate for its repair.	Present state or condition.	Remarks by Superintending Engineer.
Bellary.—(Concluded.)	Tadpatry ...	*Nil* ...	RS.	There are no tanks in this taluq of any size, and their situation is such that no harm can happen to the Railway line if any of them were breached.	
	Adony ...	Adony Tank ...	......	A small but deep tank fed by hill stream ; has two calingulahs of 22 and 37 yards respectively in length, which carries the surplus water under the Railway line through the openings, one of 20 feet and the other 12 feet, and after crossing the Madaveram road through a 4-vent tunnel eventually falls into Mundicary Wunkah.	
	Do. ...	Issavee Tank ...	53	Source of supply, hill drainage and also, when Ballgarry Cunta discharges over its calingulah, Issavee tank ; calingulah 48 feet long. Bund in good order excepting near the sluice, an estimate for which is herewith forwarded for sanction.	
				Surplus channel of Issavee tank leaves it at the southern extremity of the bund and flows under the Railway embankment through girder openings of 21, 11, 20, and 20 feet span, and ultimately falls into the Bussapoor Wunkah.	Estimate sanctioned for immediate execution.
	Do. ...	Ballgarry Tank...	......	A small deep junta above the Issavee tank. Source of supply, hill drainage. Bund in good order and revetted on both sides ; discharges over a natural calingulah 9 feet long into the Issavee tank.	
	Do. ...	Narsapoor Cunta near Adony.	880	A tank of some size fed by hill drainage, very much out of order, but from the smallness of the ayacut, it is doubtful whether it would pay to repair it, as the estimate herewith forwarded amounts to Rupees 880. The surplus channel flows under the Railway embankment through two girder openings of 12 and 18 feet respectively and affords sufficient water-way.	Returned to Ghooty Range to re-transmit it with ayacut, etc., information.

Statement showing the state of all Tanks in the 3rd Division, etc.—(Concluded.)

District.	Taluq.	Name of Tank.	Amount of Estimate for its repair.	Present state or condition.	Remarks by Superintending Engineer.
Cuddapah.	Jummalamadugu.	Munzapatnum Chinna Chervoo Tank.	RS. 140	These three tanks are situated near the Railway, and estimates are submitted in accordance with G. O. No. 535, dated 28th February 1872. The tanks generally are in good order, and the repairs now estimated for provide for placing them beyond the possibility of disaster from ordinary causes. The bund of Chintacoontah tank requires no repair; it is very strong and revetted both front and rear. The present estimate provides for the repair of its supply channel.	Estimates for these tanks were sanctioned and the works are stated to be in progress.
		Digoova Bramanapalli Pedda Tank.	285		
		Chintacoonta Govindama Tank Supply channel.	870		

BELLARY,
30*th November* 1872.

(Signed) J. BEAN, Colonel, R.E.,
Supg. Engineer, 3rd Division.

No. 377. ORDER THEREON, 20th January 1873, No. 184.

IRRIGATION, No. 33-34.

COMMUNICATED to the Chief Engineer for Irrigation, who will give his best attention to the adoption of affectual measures for maintaining all tanks above lines of Railway in a state of security.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

No. 389. Read the following letter from the District Engineer, North Arcot, to the Secretary to Government, Public Works Department, dated Madras, 7th December 1872, No. 18 :—

I HAVE the honour to report that no item for compensation for land occupied by the Govindavady channel appears to have been entered in the estimate sanctioned for execution in G. O., No. 2,053, of 25th July 1863.

2. The Collector assesses the value of this land at Rupees 537-8-0. I beg that I may be placed in funds to meet the charge which has been admitted by Government in Order No. 138, 27th May 1872, Revenue Department.

No. 390. ORDER THEREON, 20th January 1873, No. 189.

IRRIGATION, No. 35.

SANCTIONED to be disbursed in anticipation of a specific provision of funds from savings under Agricultural, Ordinary.

2. This amount will be added to the capital expenditure on the Govindavady channel which is a portion of the Palar Anicut project.

(Signed) J. MULLINS, Lieut.-Colonel R.E.,
Joint Secretary to Government.

Read the following papers :—

No. 397. From the Deputy Secretary to the Government of India, Public Works Department, (Irrigation,) to the Acting Joint Secretary to the Government of Madras in the Public Works Department, Irrigation Branch, dated Simla, 7th June 1872, No. 442-I.

I AM directed to acknowledge the receipt of your letter No. 1,180 of the 8th ultimo, submitting for sanction an estimate, amounting to Rupees 6,740, for repairs during the four years ending December last to the main reservoir called the Survapully Tank, and proposing to allot the amount from the Reserve under Agricultural of the current year.

2. In reply I am to state that, in the absence of some further explanation, the proposal cannot be dealt with. It is not certainly known whether the whole amount of the estimate is for repairs to the old work now being improved, and whether a portion is for repairs to new irrigation works, but it seems as if the whole amount should be charged to Revenue and provided for from the ordinary grant. Under Circular No. 52 of 1871, the former would be chargeable to Revenue and the latter also, if the work is in operation and is earning, Revenue. But it is to be observed that the conversion of the Survapully Tank into a main reservoir is only one of the works comprised in the scheme for improving and extending the Pennair Project, sanctioned in this office letter No. 43-I. of the 12th March 1868, and it is desirable, therefore, that a complete estimate should be submitted for repairs to all the works embraced in that project, pending their completion, in preference to the submission of detached estimates. This estimate should not include the cost of repairs to the old works or works not earning revenue which, as before mentioned, must be defrayed from revenue or the ordinary grant.

3. Referring to your endorsement No. 822 of the 23rd March last, I am to notice that, in the progress report of "Extraordinary" Irrigation works forwarded therewith, the *sanctioned* estimate of the scheme for the improvement and extension of the Pennair Project is stated to amount to Rupees 4,20,060, whereas the estimate submitted to, and passed by the Government of India, in letter No. 43-I. of the 12th March 1868, amounted to Rupees 4,12,100 only. I am to request an explanation of this discrepancy, and to state that, if the estimate sanctioned by the Government of India is likely to be exceeded, a revised estimate must at once be framed and submitted to this Government for sanction.

4. The estimate received with your letter is herewith returned.

No. 398. Memorandum from the same Officer, dated Simla, 12th October 1872, No. 442-I.

THE undersigned has the honour to invite attention to this office letter No. 442-I. of 7th June last, calling for a revised estimate for the Survapully Tank

Project to include repairs pending completion of works and to request that its submission be expedited.

(Signed) F. H. RUNDALL, Colonel, R.E.,
Offg. Dy. Secy. to the Govt. of India.

No. 399. From the Superintending Engineer, 2nd Division, to the Chief Engineer for Irrigation, dated Camp at Masulipatam, 5th May 1872, Extra No. 2.

I HAVE the honour to report that we are unable to carry on the pitching of the slopes of the Survapully channel at even the terms allowed by Major Mullins in paragraph 9 of his report No. 35 of 9th February 1871.

2. The channel was originally cut many years ago, and the excavated earth was put far too near to its edge; now that it has been widened, the slope of channel and embankment are almost continuous, and the pressure of the latter on very poor slippery soil has thrust the foot of the former back into the bed and interferes constantly with the water-way.

3. The soil, moreover, is full of water, so that great difficulty is found in digging the trench half a yard below the proper bed of the channel; for the foundation of the stone pitching the estimate made no allowance for this excavation at all, and it is, under present circumstances, a really heavy charge, as all the earth must be carried beyond the old spoil bank. From actual work executed we have in the first length of 212 yards incurred charges at the rate of Rupees 3-7-0, $3\frac{1}{2}$ per cubic yard of pitching; the bed is very uneven and in some places we shall have to remove 5 feet of silt; Major Clay, therefore, enters Rupees 3-8-6 as the cost per yard on an average.

4. There are 24,790 cubic yards to be done which will cost Rupees 87,540, at Rupees 3-8-6 per cubic yard instead of 40,284 Rupees at Rupees 1-10-0,* or, if we take one side only as proposed by Major Mullins, Rupees 32,537 will be required. I am, however, by no means clear that we can leave the channel with only one side protected, and fear that ere long we shall be obliged to remove the spoil banks further back. It would probably be better economy to do so at once.

	RS.	A.	P.
*For pitching	1	2	0
For gravel backing	0	8	0
	1	10	0
For pitching, at	2	2	0
For gravel backing	0	8	0
	2	10	0

No. 400. From R. SMITH, Esq., Officiating Superintending Engineer, 2nd Division, to the Acting Chief Engineer for Irrigation, dated Bezwarah, 20th November 1872, No. 134.

As directed in your memorandum No. 118 of 4th July last, I have the honour to submit an estimate, amounting to Rupees 16,000, for the repairs and maintenance of the Survapully Project works during construction.

One estimate for Rupees 16,000.

2. In addition to the actual outlay shown in the second column, Rupees 1,861-4-6 appear to have been expended, as annexed, and charged to "Repairs Ordinary."

	RS.	A.	P.	RS.	A.	P.
Clearing silt and filling breaches in the Idagali channel, 1869-70 ...	227	0	0			
1870-71 ...	15	3	0			
1871-72 ...	137	7	6			
				379	10	6
Clearing silt in the old Ramareddi channel, 1870-71 ...				180	0	0
Clearing silt in the Idagali and Pudiparti channels, 1871-72 ...				1,263	9	0
Repairing and filling ground in rear of the masonry works of the Idagali and Pudiparti channels ...				38	1	0
Total...				1,861	4	6

3. With reference to paragraph 3 of your communication under reply, I beg to state that, with the exception of an extra allowance for compensation for land and for pitching the side slopes of the Survapully Channel, I do not think the sanctioned estimate will be exceeded.

4. The additional sum required for the items alluded to will be reported as soon as all the information regarding the land has been received from the Revenue Authorities.

No. 313.

No. 401. *Note by the Chief Engineer for Irrigation.*

THE Circular of the Government of India on the incidence of charges for repairs and maintenance of works, buildings, etc., on portions of canals not earning revenue having been communicated to Superintending Engineers, the Superintending Engineer, 2nd Division, on the 5th April last, transmitted an estimate, amounting to Rupees 6,740, showing the amount which had been expended on the Survapully reservoir repairs and charged to Capital; but which, under that circular, should form a separate item of the project. This estimate was submitted to the Government of India, who, in reply, called* for further information, and requested that a complete estimate for repairs to all the works embraced by the Survapully Project, of which the reservoir is one item, might be prepared; with reference also to a discrepancy between the amount† quoted as the sanction for the project, and that‡ named in the original sanction, they desired to be informed whether the estimate would be exceeded and, if so, that a revised estimate should be submitted for sanction.

G. O., 27th September 1871, No. 2,164.

8th May 1872, No. 1,180.

* No. 442-I. of 7th June 1872.

† Rupees 4,20,060.
‡ ,, 4,12,100.

The difference between the two sums is due to the sanctions of this Government as per margin, the former being for closing the centre set of under-sluices in the Pennair anicut, and the latter the

G. O., 5th January 1869, No. 12, Rupees 2,760.
,, 23rd March ,, ,, 972, ,, 5,200.

difference between the sanctioned and revised estimates for the Stonehousepetta bridge across the Survapully canal.

2. The Superintending Engineer was requested, in transmitting a maintenance estimate for the works included in the sanction, to report whether a revised estimate for the project generally would be required. In May last the Superintending Engineer reported that the pitching of the Survapully canal could not be executed for the amount allowed. The original rate allowed was Rupees 1-2-0 the cubic yard. When I inspected the works at the end of 1870, the insufficiency of this rate was brought to my notice; and, in communication with the Executive Engineer, I decided that laterite was the proper material to be used, and that Rupees 2-2-0 would be a fair rate. The rate now reported as necessary is Rupees 3-8-6, some work having been executed at Rupees 3-7-0. The Acting Chief Engineer, in reply to this letter, pointed out that the quantity of work to be done had been mis-stated, and that no details of the rate reported to be necessary had been given, and the Superintending Engineer was requested to look carefully into the matter and to report exactly what was required. It may be noticed here that, from paragraph 3 of the Superintending Engineer's letter, it would seem that the removal of some 5 feet of silt had been included in the enhanced rate for the pitching, and this is evidently altogether foreign to the work in question, and should be provided for separately under maintenance.

Extra No. 2, 5th May.

NOTE.—Paragraph 9, G. O., 24th February 1871, No. 544.

No. 83, 30th May 1872.

The Superintending Engineer was further enjoined to go over the whole project on his next visit to Nellore; to report what work had been completed; what savings, if any, had been effected; and what sum would be required to complete the works.

3. The Officiating Superintending Engineer has recently* forwarded a maintenance estimate, amounting to Rupees 16,000, for all the works included in the project, and he explains that, in addition to the sum shown in this estimate as actually expended, there have been spent Rupees 1,861-4-6 out of the allotment for Agricultural Repairs Ordinary on certain works.

* No. 134 of 20th November 1872.

This Officer further reports that, with the exception of an extra allowance for compensation for land and for pitching the slopes of the Survapully canal, he does not think that additional sanction will be required.

4. Mr. R. Smith, who has been officiating as Superintending Engineer, 2nd Division, has recently been appointed District Engineer of Nellore, and will join in the course of a few days. He prepared the sanctioned estimate for this project, and I think it will be advisable that he should examine the works carefully and thoroughly, and then forward a revised estimate with explanations of all modifications which may be found necessary. I would not recommend, moreover, the submission of the maintenance estimate to the Government of India for sanction until it has been examined by Mr. Smith on the spot; and that Officer should, I think, be instructed to distinguish between expenditure under this head, due to the

use of the works for irrigation, and that due or required for the purposes contemplated in the circular of the Government of India. Many of the works have been in use all along and much, therefore, of the maintenance outlay is, in my opinion, properly chargeable to Revenue.

FORT ST. GEORGE, (Signed) J. MULLINS, Lieut.-Colonel, R.E.,
11th December 1872. *Chief Engineer for Irrigation.*

No. 402. ORDER THEREON, 21st January 1873, No. 193.

IRRIGATION, No. 36.

ORDERED that these Proceedings be communicated to the District Engineer of Nellore, who will act in conformity with the instructions contained in the Note by the Chief Engineer for Irrigation, and submit as early as he may be able a revised estimate for the Survapully Project, as also a maintenance estimate for such work as has been, or will have to be, executed for the up-keep of works or portions of works prior to their being brought into use. Expenditure on the maintenance or repair of works in use should, from the date of their being so employed, be met from the grant for Repairs Agricultural under Ordinary. Probably the Survapully reservoir and perhaps some other works will require, in this latter respect, to be treated specially, because though in use during the progress of the works, the maintenance of the large additions would be properly chargeable under Circular No. 52 of the Government of India.

G. O., 27th September 1871, No. 2,464.

2. Ordered also that a copy of these Proceedings be forwarded to the Government of India with the following letter.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

No. 403. From the Secretary to the Government of Fort St. George, Public Works Department, to the Secretary to the Government of India, P.W.D., dated 21st January 1873, No. 194.

IRRIGATION, No. 37.

SRI,—I am directed, with reference to the letter No. 442-I., dated 7th June last, from the Deputy Secretary to the Government of India, to transmit a copy of the Proceedings of this Government under date the 21st instant, No. 193, and to state that a further report on the Survapully Project, together with the estimates called for, will be submitted as early as may be practicable.

Read the following papers :—

No. 433. From the Acting Superintending Engineer, 1st Division, to the Chief Engineer, Public Works Department, dated Dowlaishweram, 30th November 1872, No. 3,136.

ADVERTING to G. O., No. 2,052, dated 28th August last, I have the honour to report, for the information of Government, that the Collectors in this division were communicated with as to the desirability or otherwise of retaining under their control the establishment entertained for the express purpose of distributing water in connection with tanks and minor irrigation works, and I now beg to give their opinion on the subject.

2. The Collector of Ganjam states that he is not aware what conservancy establishment is at present employed under the Public Works Department and what duties they perform, but if these consist in the distribution of water, he is of opinion the establishment should be transferred to the control of the Revenue Department. With regard to this opinion, I have to invite the attention of Government to copy of Major Beckley's letter forwarded with mine of the 10th July 1871, No. 1,162, from which it will be seen that that officer considered it desirable that the Conservancy Establishment had better be entirely under the Public Works Department under certain conditions.

3. The Collector of Vizagapatam reports that, as the distribution of water is under the control of the Public Works Department, he is of opinion that the establishment connected with it should also remain under the same authority.

4. The Collector of Godavery suggests the transfer of the establishment entertained for the distribution of water in the Yelleru river from the Public Works to the Revenue Department Budget.

5. I am of opinion, I beg to add, that these establishments had better remain with the Revenue Department in all cases except where they have to supervise a system of works as in the Kistna or here in this district.

No. 321.

No. 434. *Note by the Chief Engineer for Irrigation.*

THIS letter is stated to have been written with reference to G. O., 28th August last, No. 2,052, but it does not afford the information required.

Lieutenant-Colonel Fischer was asked to report whether, having regard to the principle laid down in that order, any members of the conservancy establishments now charged in the Public Works Budget ought to be transferred to the control of the Revenue Department, and what corresponding transfers of funds should be made from the Budget of the one to that of the other department; but instead

of affording this information in detail for each of the three districts of the 1st Division, he transmits the general opinions of two of the Collectors, who do not appear to have been told what establishments there are in existence, and what the nature of the duties of each separate establishment is, while, as regards the third district, the Collector's suggestion that the Yelleru river establishment should be transferred is reported, but there is nothing to show whether the control of this establishment should, according to the rule laid down, be retained by the Public Works or transferred to the Revenue Department.

All the other establishments in the Godavery are connected with the delta works, and will remain therefore as at present under the control of the Public Works Officers.

2. For the Ganjam District the provision for Neeranikum establishment in the Public Works Budget is Rupees 1,244, and for Ganjam Rupees 628, but no details are given in the Budget, and the District Engineers should prepare a detailed list, and then, in communication with the Collector, settle what portions of these establishments it will be proper, respectively, to retain and transfer to the Revenue Department.

FORT ST. GEORGE, (Signed) J. MULLINS, Lieut.-Colonel, R.E.,
16*th December* 1872. *Chief Engineer for Irrigation.*

No. 435. ORDER THEREON, 22nd January 1873, No. 210.

IRRIGATION, No. 38.

ORDERED that the Note by the Chief Engineer for Irrigation be communicated to the District Engineers of the Godavery, Vizagapatam, and Ganjam Districts, who will, with reference to G. O. of the 28th August last, No. 2,052, and to the remarks of the Chief Engineer, lose no time in reporting what transfer of control and funds will be required.

(Signed) C. J. SMITH, Captain, R. E.,
Officiating Under Secretary to Government.

Read the following letters :—

No. 457. From the Controller of Public Works Accounts, to the Secretary to Government, Public Works Department, dated Fort St. George, 20th December 1872, No. 2,230.

IN paragraph 3 of my letter No. 2,099-A, dated 14th November 1871, I reported that I had called upon the several Superintending Engineers for the details of the

items of expenditure appearing in their Remunerative Statements for 1870-71. Replies from all divisions save the sixth have been received to my reference, and although I have on several occasions reminded the Superintending Engineer of the 6th Division of my requisitions, no answer in any form has reached me. I have this day telegraphed on the subject to the District Engineer, Tanjore, whose reply will, on receipt, be laid before Government.

2. It will be impossible for this office to check the accuracy of the Statements of Remunerative Works in accordance with the orders of Government until the required details are completely furnished, and looking to the importance which is attached to this matter, and to the calls for Capital and Revenue Returns which are made upon me by the Accountant-General of the Public Works Department, I have considered it my duty to inform Government of the present state of the question.

No. 458. From the Officiating District Engineer, Tanjore, to the Chief Engineer for Irrigation, dated Tanjore, 24th December 1872, No. 769.

WITH reference to your Memorandum No. 333, dated the 20th December, I have the honour to furnish the following explanation regarding the delay in replying to the Controller's requisitions marginally noted.

No. 466½, dated 14th November 1871.
,, 951, ,, 30th ,, 1872.

2. The Controller's requisitions above referred to relate to the Statements of Remunerative Works for the years 1870-71 and 1871-72. The Statements of Remunerative Works for 1870-71 for the Tanjore and Trichinopoly Districts were submitted to the Controller on the 4th November 1871 in the usual form, these, however, were returned with his letter No. 466½, of the 14th November 1871, with a request that the details making up each of the figures appearing in columns 3, 4, 7, and 8 of the statements may be furnished. A similar requisition was made by the Controller in his letter No. 711, dated the 27th September 1871, for the details of the figures appearing in columns 2, 3, and 4 of the Statement of Reproductive Works for the year 1869-70.

3. It will be observed that the sums entered in columns 3 and 7 of the Statement of Remunerative Works represent the expenditure incurred under Capital and Revenue or Construction and Maintenance of the several works entered therein from the date of their construction, and to trace out the details of these sums as they have been expended in each year from the old records at this remote date is indeed not an easy task.

4. With reference to the Statement of Reproductive Works, it can be easily imagined how considerable should be the labour in tracing out the details of the sums entered in column 2, in which the cost of all the works executed up to date in each section or group of irrigation works is shown. In the first place, the statement as it was submitted for 1869-70 was not correct, inasmuch as it did not include all the works executed in former years in each section therein shown, it is necessary, therefore, to entirely revise the statement before it is re-submitted. The labour entailed in tracing out the details of the sums entered in the Statements of

Remunerative and Reproductive Works above referred to, in addition to the daily multiplying calls for reports and returns from all sides, has occupied a considerable time in the late Superintending Engineer's Office, and I hope to be able to submit the statements in a complete form by the 15th of January next. The Statement of Remunerative Works for 1871-72, called for in the Controller's Memorandum No. 951, dated 30th November 1872, has not been submitted pending the completion of the statement for 1870-71, but it will be submitted together with the statement for 1870-71.

No. 459. ORDER THEREON, 22nd January 1873, No. 222.

IRRIGATION, No. 39.

ORDERED to be communicated to the Controller of Public Works Accounts with reference to his letter of the 20th December 1872, No. 2,230.

2. The Government observe that the Controller's references to the late 6th Division should have been answered, and explanations, such as those now given, afforded.

(Signed) J. MULLINS, Lieut.-Colonel, R.E.,
Joint Secretary to Government.

No. 460. Read the following letter from the District Engineer, Godavery District, to the Secretary to Government, Public Works Department, dated Dowlaishweram, 21st December 1872, No. 255 :—

ADVERTING to G. O., No. 2,358-A, dated 8th October 1872, and in continuation of my letter of the 23rd idem, No. 2,619, I have the honour to forward a list of the floating stock from the Upper Godavery, received by the Executive Engineer in charge of the No. 1 Range, Godavery.

One List.

2. Captain Mead reports that he does not think any more boats are likely to come down this season, and I have no doubt he is right in this.

3. The floating plant is, as I had expected, in no satisfactory condition and will cost a good deal to repair it and adapt it to our works, and the maintenance cost will also be heavy; but every endeavour shall be made to utilize the plant as much as possible.

4. I beg further to add I am despatching to the District Engineer of the Kistna the quantity he had indented for as shown in G. O. of the 10th December 1872, No. 2,923, except as regards paddle-boats, which are here and are required for Colonel Rundall's use.

List of Floating Stock from the Upper Godavery, received at Dowlaishweram.

Steamer *Prince* ...	...142′ × 25′	Iron paddle-steamer under orders to Cocanada Harbour.
1 Wooden deep boat ...	... 70 × 10 × 5	Bad order; repairable.
1 Do.	do.	
Iron deep boat	... 40 × 12 × 3	Built of $\frac{1}{8}$ iron, square ends with 3 light frames across boat.
Do.	do.	
Do.	do.	Fair order; fit to carry only sand and lime.
Steel barge, deep boat...	... 90 × 14 × 4	Built of $\frac{1}{8}$ plates, square ends with light frames across boat. Fair order; fit to carry sand and lime only.
Iron punt	... $35\frac{1}{2} \times 8\frac{1}{2} \times 3$	Requires repair. Small boats not much use for any thing.
Do.	... $30 \times 7\frac{1}{2} \times 2\frac{1}{4}$	Do.
Wooden punt	... $28\frac{1}{2} \times 8 \times 2$	Do.
Wooden paddle-boat ...	... $30 \times 7 \times 6\frac{1}{2}$	Small repairs required.

DOWLAISHWERAM,
16*th December* 1872.

(Signed) H. R. MEAD, Captain, R.E.,
Executive Engineer, Godavery District.

No. 461. ORDER THEREON, 22nd January 1873, No. 223.

IRRIGATION, No. 40.

ORDERED to be recorded.

(Signed) J. MULLINS, Lieut.-Colonel, R.E.,
Joint Secretary to Government.

No. 470. Read the following letter from the Chief Engineer for Irrigation, to the Secretary to Government, Public Works Department, dated Fort St. George, 20th December 1872, No. 68 :—

I HAVE the honour to forward herewith a Register of lands taken up by the Madras Irrigation and Canal Company in the Kurnool District under class A, during the month of July 1872, together with a bill, amounting to Rupees 471-12-4, for compensation to be paid thereon; and to request that you will be good enough to obtain the sanction of Government to the same.

No. 471. ORDER THEREON, 23rd January 1873, No. 228.

IRRIGATION, No. 41.

SANCTIONED.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

No. 495. Read the following Proceedings of the Board of Revenue, dated 11th November 1872, No. 2,180:—

Proceedings of the Madras Government, dated 26th August 1872, No. 2,031, Public Works Department.

ABSTRACT.—*Irrigation Works.*—Letter from the Government of India noticing with satisfaction the orders passed by the Madras Government regarding the preparation of statements showing the financial results from irrigation works and the introduction of the new forms of account for irrigation projects, and desiring the submission of certain information on the subject, communicated to the officers concerned with instructions.

THE Board observe that paragraph 6 of G. O. No. 1,102 of 30th April 1872, has been already replied to in their Proceedings, dated 28th May 1872, No. 842. There are still three districts* from which the returns are due, and the Collectors of those districts have been requested to despatch them at an early date.

* Ganjam, South Arcot, and Trichinopoly.

2. With reference to the Irrigation Registers referred to in paragraph 2, the Board observe that they are reported to have been completed, or almost completed, in all the districts excepting the four noted in the margin. Most of them, however, are not yet printed, some being still with the Superintending Engineers, to whom they were sent in order that the columns of expenditure, etc., might be filled up.

Standing Circular No. III. of 1869.

1. Chingleput, 2. South Arcot, 3. Salem, and 4. Godavery.

3. The Collectors of all the districts, excepting the three noted in the margin in which there are no irrigation works, will be requested to report at once how many registers have been finally prepared and printed and how many remain yet to be printed, and the cause of the delay. They will also state how far the mode adopted by them for calculating the revenue under each source of irrigation corresponds with the instructions contained in the Board's Proceedings, dated 17th June 1872, No. 1,018, and approved of by Government in their Order, dated 25th July 1872, No. 1,766, copies of which are herewith forwarded.

Nilgiris, South Canara, and Malabar.

No. 496. ORDER THEREON, 24th January 1873, No. 240.

IRRIGATION, No. 42.

ORDERED to be recorded.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

No. 499. Read the following letter from the Controller of Public Works Accounts, to the Secretary to Government, Public Works Department, dated Fort St. George, 18th December 1872, No. 2,198 :—

I HAVE the honour to submit the accompanying List of Agricultural Works for which appropriations have been sanctioned by Government, and to request that you will be good enough to decide the head* to which the expenditure should be charged.

1 List.

*1. Capital Ordinary.
2. Revenue.
3. Ordinary Agricultural Works.

List of Sanctions by Government for Agricultural Works from 1st *April* 1872 *to the present date.*

Order of Government. No.	Order of Government. Date.	Particulars.	Amount of Estimate.	Appropriation.	Head to which chargeable.
	1872.	*Godavery.*	RS.	RS.	
1,036	22nd April...	Experiments for the manufacture of concrete	5,000	5,000	No. 3.
935 1,363	9th April. 31st May.	Constructing a new drop weir at the end of the Samulcottah canal	2,650	2,650	No. 2.
1,429	8th June ...	Side channel with masonry works to be taken off Cocanada canal	4,460	1,698	No. 1.
,,	,, ...	Iron girder bridge across Thooliabaga channel ...	3,490	588	No. 3.
		Kistna.			
935 1,363	9th April. 31st May.	Channel with subsidiary works for the better supply of Budam and Alloor lands ...	46,420	23,000	No. 1.
,,	,, ...	Restoring the Peddacuncherla tank	23,730	10,000	No. 3.
,,	,, ...	Drainage channel from Shevagunga sluice to the Tidal creek	21,360	10,000	No. 3.
1,429	8th June ...	Bridge across the Ellore High Level canal at Perikeed ...	8,180	3,490	No. 3.
,,	,, ...	Fish ladder at the Kistna anicut	1,665	511	No. 3.
,,	,, ...	Make-shift head-sluice for controlling the flow of water into and out of the tanks in the Divi Division	6,700	6,700	No. 3.
		Nellore.			
1,429	8th June ...	Repairs to the Main Reservoir of the Survapully tank ...	6,740	6,740	No. 2.
		Kurnool.			
,,	,, ...	Constructing a new waste weir to the Moothialpaud Yerra tank	2,740	2,740	No. 3.
		Bellary.			
,,	,, ...	Restoration of the Gootloor tank	60,500	8,633	No. 3.

List of Sanctions by Government for Agricultural Works, etc.—(Concluded.)

Order of Government. No.	Order of Government. Date.	Particulars.	Amount of Estimate.	Appropriation.	Head to which chargeable.
	1872.	*North Arcot.*	RS.	RS.	
935 1,363	9th April. 31st May.	Re-opening the Seesamungalum supply channel ...	10,375	7,200	No. 3.
1,429	8th June ...	Improvements to the Poloor channel and constructing a dam across the river and the head sluice and three masonry falls in the channel.	11,650	6,000	No. 3.
		South Arcot.			
,,	,, ...	Anicut across the Manimuthanady river near Mamathoor	55,800	3,890	No. 1.
,,	,, ...	Do. across the Myooranady river near Kattoomyloor ...	12,663	1,365	No. 3.
,,	,, ...	Improving the Allangal channel	15,330	2,288	No. 1. *Vide* G. O., No. 2,889, dated 7th December 1872, ordering the expenditure to be debited to Capital in the remunerative statement, but nothing is said as to the head under which the outlay should appear in the monthly accounts; and the work in question is not one of those referred to in paragraph 6 of G. O., No. 1,310, dated 14th May 1872.
,,	,, ...	Bund across the Bahoor tank between the French and English villages	3,050	*3,050	No. 3. **Vide* G. O., No 2,757, dated 23rd November, ordering Rupees 3,040 to be credited to Reserve.
		Salem.			
935 1,363	9th April. 31st May.	Constructing a tank at Valayamadany	8,670	5,010	No. 3.
,,	,, ...	Do. a tank at Chinnakisnapuram	8,070	1,420	No. 3.
1,429	8th June ...	Moonganvorpatty Suriagounden anicut and channel ...	1,043	320	No. 3.
		Trichinopoly.			
935 1,363	9th April. 31st May.	Improvement of the Nungavoical	12,500	2,400	No. 3.
		Coimbatore.			
1,429	8th June ...	Restoration of the Nilambur tank	4,300	3,275	No. 3.
		Tinnevelly.			
935 1,363	9th April. 31st May.	Maintenance of buildings and channels connected with Streeviguntum project ...	8,400	8,400	No. 2.
1,429 2,780	8th June. 26th Nov.	Building a dam in the Tamariaur river ... ... Supplemental estimate ...	8,570 234	4,285 117	No. 3.

(Signed) S. BROCK,
Controller of Public Works Accounts.

Fort St. George,
18*th December* 1872.

No. 500. ORDER THEREON, 24th January 1873, No. 242.

IRRIGATION, No. 43.

SUBJOINED is the list of works referred to in the Controller's letter, and opposite each has been denoted by a number the head of account to which the work appertains.

2. In future sanctions the head of account will be indicated in the margin of the order of Government.

(Signed) C. J. SMITH, Captain, R.E.,
Officiating Under Secretary to Government.

No. 508. Read the following paper :—

No. 578.

Statement showing the sums Received and Disbursed at this Presidency on account of the Madras Irrigation and Canal Company during the Month of November 1872.

	Receipts.		Disbursements.	
	Capital Account.	Revenue Account.	Capital Account.	Revenue Account.
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
Bank of Madras.				
Amount paid to the Agent and Manager, Madras Irrigation and Canal Company, on Credit Order No. 3, dated 14th November 1872...	......	......	......	18,000 0 0
Collector of Kurnool.				
Tax for water supplied by the Irrigation and Canal Company realized in November 1872	......	723 15 2	......	......
Amount received in do. on account of assessment of land made over to the Company	......	29 2 10	......	......
Payments from the commencement, namely, 1st October 1859 to 31st October 1872, on Capital Account	......	......	93,58,307 0 5	......
Payments from the commencement, namely, 1st October 1859 to 31st October 1872, on Revenue Account	......	......	......	1,38,455 3 5
Receipts from the commencement, namely, 1st May 1865 to 31st October 1872, on Capital Account.	1,68,417 5 9	......	......	......
Receipts from the commencement, namely, May 1865 to 31st October 1872, on Revenue Account	......	78,176 15 4	......	......
Grand Total of Receipts and Disbursements up to 30th November 1872... ...	1,68,417 5 9	78,930 1 4	93,58,307 0 5	1,56,455 3 5

FORT ST. GEORGE,
ACCOUNTANT-GENERAL'S OFFICE,
6th January 1873.

(Signed) F. LUSHINGTON,
Accountant-General.

FORWARDED to the Secretary to Government, Public Works Department, Fort St. George.

Vide letter from Financial Secretary to the Government of India, dated 24th June 1869, No. 1,375.

No. 509. ORDER THEREON, 24th January 1873, No. 247.

IRRIGATION, No. 44.

ORDERED that the foregoing statement be communicated to the Chief Engineer for Irrigation and that the following letter be despatched.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

No. 510. From the Secretary to the Government of Fort St. George, Public Works Department, to the Under-Secretary of State for India, dated 24th January 1873, No. 248.

IRRIGATION, No. 45.

SIR,—I am directed by the Right Honourable the Governor in Council to forward the accompanying Statement which has been furnished by the Accountant-General showing the sums received and disbursed in this Presidency on account of the Madras Irrigation and Canal Company for the month of November 1872. The aggregate amount expended up to the 30th November was Rupees 95,14,762-3-10.

	RS.	A.	P.
Capital	93,58,307	0	5
Revenue...	1,56,455	3	5

No. 511. Read the following endorsement of the Chief Engineer for Irrigation, dated Fort St. George, 19th December 1872, No. 67 :—

From the Acting Manager of the Madras Irrigation and Canal Company, to the Examiner of Accounts, dated Madras, 18th December 1872, No. 41.

I HAVE the honour to enclose, for the favour of your signature, an indent for funds required for Revenue expenditure, and in compliance with your suggestion I have inserted an amount sufficient to carry us on to the end of January next.

2. I must explain that the last Revenue Indent, which was for Rupees 18,000, purported to be for the months of November and December 1872 and January 1873, but it has not sufficed for that period, because in calculating the amount the proportion of General Management was not included.

3. The item of General Management has now to be provided for, for the months September to December 1872, and you will observe that in the Indent I have entered Rupees 3,000 as a liability for each of those months. The Rupees 9,000 entered for January 1873 is the average monthly expenditure, inclusive of the proportion of General Management.

4. As my balance of the Revenue Advance is so small, and I have to provide for the Maintenance Establishment expenditure early next month, I will ask you to be so good as to expedite the Indent, and if, when you have signed the document you will, to save time, send it on direct to the Chief Engineer for Irrigation, you will very much oblige me.

REVENUE ACCOUNT.

MADRAS IRRIGATION AND CANAL COMPANY, 18TH DECEMBER 1872.

Requisition on the Government for Cash Advance on account of Revenue to 31st January 1873.

——	Capital.	Revenue.			Total.		
	RS. A. P.	RS.	A.	P.	RS.	A.	P.
Balance, 1st December 1872	...	2,542	2	9	2,542	2	9
Average expenditure of three preceding months ...	...	9,000	0	0	9,000	0	0
Amount of liability in respect of Sept. 1872 ...	...	3,000	0	0	......		
Do. do. of Oct. ,, ...	...	3,000	0	0	......		
Do. do. of Nov. ,, ...	...	3,000	0	0	......		
Do. do. of Dec. ,, ...	...	3,000	0	0	......		
Required for January 1873	...	9,000	0	0	21,000	0	0
Amount now applied for	...	21,000	0	0	21,000	0	0

It is requested that Credit may be afforded on the following Treasury— RS.
Bank of Madras 21,000

(Signed) C. A. BADHAM,
Acting Manager.

(Signed) C. M. MOBERLY, Captain,
Government Examiner.

FORWARDED to Chief Engineer for Irrigation in explanation of accompanying supplementary requisition for Revenue Advance.

MADRAS, (Signed) C. M. MOBERLY, Captain,
18th December 1872. *Examiner of Railway Accounts.*

SUBMITTED for the sanction of Government.

2. The last Indent was sanctioned by Government in their Order No. 2,644, dated 9th November 1872.

3. The Revenue receipts up to this date in the aggregate amount to Rupees 84,908-5-9, and the aggregate sums advanced to Rupees 1,56,455-3-5. The Company will therefore, if this advance be sanctioned, stand indebted to Government to the extent of Rupees 92,546-13-8.

(Signed) C. J. SMITH, Captain, R.E.,
for *Chief Engineer for Irrigation.*

No. 512. ORDER THEREON, 24th January 1873, No. 249.

IRRIGATION, No. 46.

SANCTIONED.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

Read the following papers :—

No. 520. Proceedings of the Revenue Department, dated 11th December 1872, No. 1,663.

Proceedings of the Court of Wards, dated 20th November 1872, No. 2,235.

From the Acting Collector of the Godavery District, to the Secretary to the Court of Wards, dated Cocanada, 25th October 1872, No. 336.

Court's Proceedings, 25th Sept. 1871, No. 4,111.
Do. 27th June 1872, No. 1,125.
G. O., 4th July 1872, No. 1,032.
Court's Proceedings, 5th July 1872, No. 1,224.
G. O., 17th Aug. 1872, No 1,212.
G. O., 2nd Aug. 1872, No. 1,825, P. W. D.
Court's Proceedings, 29th Aug. 1872, No. 1,724.
Do. 13th Sept. ,, ,, 1,825.

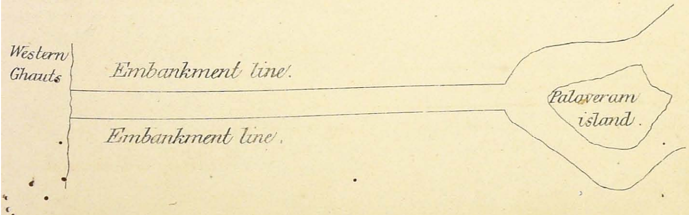
I HAVE the honour to refer the Court to the papers noted in the margin. They relate to the embankment of the Godavery at Kesanakurru. According to the orders contained in the Court's Proceedings, No. 1,825, I have desired the Sub-Collector to put a stop to the work. I cannot find in my office any paper to show that Government built the embankment along the Proprietary Estates: I have always assumed that it had, and so has every one I have spoken to on the subject, and I do not think there is any more to show that Government built the embankment along its own land. Mr. Stuart writing to me says—

"1. The fact that the embankment now in a ruinous state was executed by Government is proved, first, by the fact that there is no Zemindar who could have done it, or would have done it, since it protects Government villages as well as Zemindari villages, and since it is too big a work for the small proprietors of that part, and since in going through the villages every villager tells you in the same words the history of the embankment, and the name of the Collector who constructed it.

"2. The fact that the Zemindars pay by way of peishcush probably as much as Government would take from the lands in cultivation if they were ryotwari, a fact due to the Zemindari tenures of this district being mostly the remains of the old renters and not of ancient Zemindaries.

"3. That Government holds as ryotwari a considerable part of the island, which, if the embankment be put in good order, will greatly improve, but if not, will undoubtedly yield a less revenue than it has done during the last 20 years since the embankment was constructed.

"4. That the Government are absolutely bound to construct the embankment is a consequence necessarily following from their having constructed the two lines of embankment which enclose the Godavery from the ghauts to the sea. It is easy to see how the Polaveram island must necessarily be ruined by the river embankments above it unless similarly protected itself, for the water which in a high fresh spread pretty well all over the delta before the construction of the main lines of the Godavery embankment, being by the embankment confined into the comparatively narrow space between the embankments, rises much higher than it would have done before the construction of those banks, and by the banks is led to hurl itself straight on the top of the unfortunate Polaveram island down to the head of which the river embankments continue nearly parallel. I illustrate the way in which the Godavery has been converted into a huge squirt for the destruction of the Polaveram islanders as soon as their protection is allowed to go to ruin.



"The floods of the river are brought down at from 3 to 9 feet above the level of the country by reason of being confined between the embankments, and these are to be allowed to shoot clear over Polaveram island, which is of the same level as the country on the main land at either side, and with all the force accumulated by not having been allowed to spread over the whole delta as before the river embankment was constructed. Are not then those who constructed the river banks from the ghauts to the sea answerable for the injury done to Polaveram island by the excessive floods ?"

2. I think we may assume that Government built the embankment along its own banks, and having done so, I imagine that it was bound to build the embankment to protect the Polaveram island from the higher floods, which the rest of the embankment would cause : not only so, I imagine that the Government of that day did consider itself bound to build this, and did build it.

3. If then they built it from a sense of duty, and not merely by way of a present to the Zemindars, it would be but natural that they should consider it their duty to keep it in repair.

4. It is true that I cannot find any positive order of Government on the subject of repairs to this : but there is some correspondence between the Collector and the Civil Engineer, which shows that the river embankment along its own length was considered by the District Officers a work, the cost of repairing which should be borne by Government. Mr. DeButts, the Civil Engineer, writing to the Collector in January 1844, observes that the repairs to these embankments should be done in the first instance by Government, and the amount expended recovered from the different Zemindars. The Collector then issued orders that the amount expended should be paid by the Proprietor of the Kapileswarapuram estate : but in October 1845, Major Cotton, who was then Civil Engineer, wrote to the Collector in the following terms :—

"With respect to the money expended on the river embankment, it is to be observed that these works are constructed for the general protection of the whole tract of delta country lying on that side of the river which in this case contains perhaps 250 villages and not for the benefit of those lying along the line of the embankment only, which are but 24, and therefore it would be manifestly unjust to make these few bear the burthen of a great work constructed for the benefit of a great number, and on this ground about one-tenth of the sum expended only could justly be demanded, but further the villages on the bank of the river are those least benefited by the embankments, and indeed in some of them the inhabitants scarcely wished for them, for though they often suffer from the floods, yet being all on a higher level than the villages behind them, they are much sooner relieved, and again, on the other hand, they are considerably benefited by the sediment from the water. They therefore should not be called on to pay even in proportion, but if they form one-tenth of the number, probably one-twentieth would be an ample proportion of the cost for them to pay. Again, in this case not only should the proprietors of villages along the embankment be called upon to pay, but also those of all other villages benefited by these works, and as to adjust the proportion of each would be almost an endless task, as the total amount that could be justly claimed is so small, as instead of making the river villages dislike the embankments, it is for the special interest of Government that they should be in every way encouraged to watch over them and preserve them. I am of opinion that on no account whatever should any demand be made upon them for a portion of the money expended, but on the contrary that they should be assured that if at any time they execute any repairs themselves, which upon examination are considered by the Government servants to have been necessary, the money would be repaid to them. To have the inhabitants who are on the spot thus encouraged to do any small repairs that may be required, so that when the embankments are in danger, whatever can be done at the moment to prevent breaches may be executed, would be a great point. It is the greatest mistake to make the embank-

ments a burthen to these villages, upon which we are most dependent for their being preserved from being breached. Thus, in this very village, I found in my late inspection of the river bankment by a flood of last year, and I purposed when the opportunity offered of recommending that the sum so expended should be repaid to him, as indeed it is no more than just as well as politic that works which are necessary for the public welfare should be executed at the public cost. Under these circumstances, I beg to recommend that not only should the present demand be withdrawn, but that in general the river embankments should be considered entirely as Government works, executed for the protection of the whole of the delta lands, and that every possible encouragement should be given to the inhabitants of villages situated on them to preserve them."

5. It does not appear that the amount demanded from the proprietor was collected; the Collector agreed with Major Cotton, and directed the Tahsildars to "take care of the bank along the whole line of the Godavery, showing equal regard to the Zemindari as to the Circar villages, to adopt immediate measures wherever a breach may occur, and to spend such sums under the head of "emergent" as they may find necessary."

6. In a letter written in January 1850, the Collector in reply to a letter from the Sub-Collector, asking whether a part of the embankment was to be repaired by Government or by the Zemindar, said that "the embankments of the Godavery are now kept up exclusively at the cost of Government."

7. There are instances in which other parts of the embankment have been repaired at the expense of Government.

8. Certainly all this was done by the district authorities; and as I have before said, I can find no order of Government on the subject; but it must be remembered that at the time I have been referring to, the public works were under the charge of the Collector, and therefore whether he was right or wrong in considering Government liable to the expense of these repairs, he would be considered to be speaking with sufficient authority when he gave these orders, and I think it would not be good policy, just at this time, when the repairs are urgently needed, to say that the Collector was wrong.

9. Polaveram island is not entirely Zemindari; there are several Government villages on it; the embankment is a protection to them as well as to the Zemindari lands.

10. Thus, then, referring to paragraph 5 of the Chief Engineer's memorandum, I must remark that Mr. Happell's statement does not rest on his own authority; the Polaveram island is not all Zemindari, and that there is record to show that expenditure would have been incurred if it had been required. I therefore came to the conclusion that Government ought not only to pay a share of the cost, but to pay the whole cost.

11. But whether Government pays anything or nothing towards the repairs, they must be carried out, unless the island be allowed to be washed away, and as the estate is at present under the management of the Court of Wards, I think that Government might be asked to direct the Public Works Department to undertake these repairs, without waiting for the question of payment to be settled first. I think that such works in Zemindari estates under the Court of Wards should be executed by the Public Works Department, as much as works on which

Government spends its own money; at all events, the officers of that department might be required to give what assistance they can, instead of declining to have anything to do with it.

12. There is another point that I would remark on: it seems that the fact of the work requiring very careful investigation is considered sufficient reason for its being indefinitely postponed. The estimate was framed, and it was rejected, not because the work was considered unnecessary, but because it had not been properly prepared.

13. Under those circumstances, I should have thought that the Superintending Engineer might have taken speedy measures for having a proper estimate prepared, but I am not aware that anything has been done at all.

14. I would ask the Board to get Government to have these repairs carried out as soon as possible. The estate requires them, and as it is now only under management, it may have to be given up before these repairs are done, unless they are done quickly. I do not know of an estate that has not improved during the time of its being under management, and it would be a pity to allow this single instance to remain as a blot on our administration.

15. I will send shortly the account of the expense incurred by Mr. Stuart.

16. I should mention that on the date of the Court's Proceedings, No. 1,825, September 13th, the Godavery freshes were not at an end.

This letter will be submitted to Government, and as the correspondence is of considerable standing, the facts of the case may be conveniently recapitulated at the present stage.

2. Two permanently settled estates in the Godavery District, Kapileswarapur and Kesanakurru, being the property of a Minor, are under the management of the Board of Revenue, as Court of Wards. The rent-roll of each estate is about 15,000 Rupees. In the Court's Proceedings No. 1,622 of 19th April 1871, reviewing the condition of all the estates under their charge, it was observed that "about Rupees 11,000 were due from the Kesanakurru ryots, and that the poverty of these defaulters was occasioned by the repeated loss of their crops owing to the non-repair of the neighbouring Godavery embankment." Further information being called for, the Head Assistant Collector, in temporary charge of the district, reported that "the embankment was repairable at the cost of Government, and that he had been informed by the Executive Engineer that an estimate of Rupees 22,000 had been made for the work and that the same would be put in hand this season." The Court being satisfied, ordered this report to be recorded.

Proceedings, No. 4,111, dated 25th September 1871.

3. Some six months elapsed, when on a representation from the Collector that nothing was being done by the Department Public Works in the matter, the case was again brought to the notice of Government with a further expression of the Court's hope that funds might be provided for the work at an early date. No action however was taken, and as the season was drawing to a close and the

Proceedings, No. 677, dated 29th April 1872.

freshes of the river would prove highly disastrous to the estate in its present unsecured condition, the Collector at his own earnest request was authorized by the Court to commence the repairs with the funds of the Minor. This Order, dated 27th June last, No. 1,125, was duly communicated to Government, who desired the Court to report " the amount debitable to Government, so soon as they were in a position to do so."

G. O., No. 1,032, dated 4th July 1872.

4. Matters being at this stage, an Order of Government was received, forwarding a Memorandum by the Chief Engineer. He stated on the authority of departmental reports from the Superintending Engineer and other officers, that the promise held out to the Collector by the Executive Engineer was not that the work would be carried out *this* season, but *another* season; that the estimate of Rupees 22,000 specified by the Collector had been at once rejected by the Superintending Engineer, as proceeding from an incompetent subordinate and based on insufficient data; finally, that the lands and villages in danger formed portion of a *lanka* or island in the river which was entirely Zemindari; and that " it did not therefore appear how any portion of the charge to be incurred would fall on Government," especially as no record could be found of any public expenditure in the official accounts of the Executive Engineer of the Range on these embankments.

G. O., D. P. W., 2nd August 1872, No. 1,825.

5. In view of these statements, the Government awaited further explanation. Meanwhile the Court of Wards had advanced the Collector as much as Rupees 10,000 from the funds of the estate, in expectation of a reimbursement from Government, and on the understanding that the work would be carried out under professional supervision. The Collector subsequently reporting that the Superintending Engineer would have nothing to do with it in the absence of proper surveys and levels, the Court directed him to stop the works without delay. This was in the middle of September, a period by which the Godavery freshes are nearly at an end, and when therefore no pressing need for completing the work could exist.

G. O., No. 1,212, 17th August 1872.

Proceedings, No. 1,825, 13th September 1872.

6. This brings the correspondence down to the Collector's letter recorded at the head of these Proceedings. In the opinion of the Court of Wards, it conclusively disposes of the greater part of the objections started by the Chief Engineer in his letter referred to above. The island of Polarum is by no means all Zemindari; the Government has extensive ryotwari lands adjacent to the Zemindari villages, and they will prosper or decay according as the embankment is maintained in good order or the reverse. The obligation of the Government to repair—putting aside all tradition that the work was originally constructed by Government—is contended for: firstly, because they undoubtedly built the *main* lines of the Godavery embankment, by which the river " is (as it were) converted into a huge squirt for the destruction of the Polaveram islanders;" secondly, because upwards of a quarter of a century ago it was decided by Major, now Sir Arthur Cotton, (the extract from whose letter deserves attentive consideration,) that the outlay is a just demand on the public purse, and that it would be most

impolitic to press any other view of the case; and lastly, because it can be shown that this doctrine has been universally recognized by the district authorities from its enunciation by Major Arthur Cotton to very recent times.

7. In these circumstances, the Court of Wards trust that the Superintending Engineer may be directed to make a careful survey and estimate, and that the work may be sanctioned with the least practicable delay. If the work executed by the Collector shall be pronounced by the Superintending Engineer useless with reference to the plan of operations he may ultimately decide upon, the Court of Wards will not of course ask for any refund of the expenses they have incurred at the cost of the estate.

Miscellaneous.

THESE Proceedings, which place the matter in a very clear light, will be transferred to the Department Public Works for early consideration and orders.

(True Extract.)

(Signed) D. F. CARMICHAEL,
Secretary to Government.

No. 521. From the Acting Superintending Engineer, 1st Division, to the Acting Chief Engineer for Irrigation and Joint Secretary to Government, Public Works Department, dated Dowlaishweram, 3rd July 1872, No. 1,271.

1 Copy of letter No. 212, dated 26th June 1872, from Executive Engineer, No. 1 Range, Godavery.
1 Copy of letter No. 103, dated 10th June 1872, from the Collector, and Captain Hasted's reply.

ADVERTING to your letter of the 13th June 1872, No. 103, I have the honour to forward a letter from the Executive Engineer in charge No. 1 Range, Godavery District, furnishing all the information he has been able to find in his records, and I regret to say I am unable to find anywhere the opinion of the Executive Engineer so much in favour of the work as Mr. Happell declares him to have been; in fact, as Captain Hasted had never found it necessary to visit Polaveram island, he could only hope it might be done in some other season.

2. There is nothing to show that the Government had ever incurred any expenditure in protecting this island. This island is a Zemindari, and as a matter of course an attempt is made to saddle the Government with the expenses of preserving it, a very common practice in this district, where the Zemindars are notorious for their waste and negligence.

3. I am sorry to find you consider I have not entered into the matter as fully as the Executive Engineer might have done, but as he was only six months in charge and had many other duties to attend to, and as far as I am aware, never visited the locality, which I had done, and observed the strong set of the river on the island, cutting off large portions every year in its floods, and finding it was all Zemindari, I gave up all idea of protecting the place as the Government could obtain no advantages.

4. If the villages you mention are to be protected at Government expense, I will have the estimates prepared after the necessary levels have been taken.

5. As regards the estimate of Rupees 22,000, mentioned in paragraph 2 of Captain Mead's letter, No. 212 of the 26th June last, I have only to observe this estimate has not been approved of or countersigned by me, and when sent to me, I rejected it at once, as I know it had been prepared on insufficient data and by an incompetent man.

From the Executive Engineer in charge No. 1 or Eastern Delta Range, Godavery District, to the Superintending Engineer, 1st Division, dated Dowlaishweram, 26th June 1872, No. 212.

In reply to your memorandum, No. 1,120, forwarding Captain Oakes' letter* regarding the question of embanking Polaveram island, I have the honour to forward copy of letter, No. 103, dated 10th June 1871, from the Collector, and Captain Hasted's reply, and excepting the opinion that partial repairs were useless and that the only thing to do was to thoroughly embank the island he does not express any views at all.

* 1 Copy of Proceedings of the Court of Wards, No. 4,111, dated 25th September 1871, returned.

2. The estimate for Rupees 22,000 was made by a Delta Superintendent without survey or levels.

3. From the above I think I may say that Captain Hasted did not, as supposed by Captain Oakes, go "carefully into the matter," and that Mr. Happell in his letter No. 308, dated 30th August, is wrong in considering (as he appears to have done) that Captain Hasted expressed an opinion that the Godavery bank here "has to be repaired exclusively by Government."

4. With regard to the 3rd paragraph, I beg to report that the north bank of the Gontamy Godavery and south bank of the stream which forms the Polaveram island are both embanked, and also that I am informed that the Gontamy Godavery has in places a small bank, which I believe* has been thrown up by the people and not done at Government cost. I beg also to remark that in my office records I can find no record of any expenditure of Government money on these banks.

* On the south side.

From the Collector of the Godavery District, to the Executive Engineer, No. 1 Range, Godavery, dated Cocanada, 10th June 1872, No. 103.

I have the honour to forward copy of an Arzi from the Tahsildar of Amalapoor regarding certain breaches caused to the river bank at certain villages in Kesevakurroo Estate, and request that you will order the necessary repairs to be made to them so as to protect the villages at an early date.

From the Executive Engineer, No. 1 Range, Godavery, to the Collector of the Godavery District, dated Dowlaishweram, 17th June 1872, No. 60.

With reference to your letter No. 103, dated 10th instant, forwarding copy of an Arzi from the Tahsildar of Amalapoor, I have the honour to inform you that partial repairs to the river bank appear to be useless, as the river water can turn any short bank. An estimate for Rupees 22,000 has been prepared for completing the bank on the Polaveram Island, and it is hoped that this may be put in hand another season.

No. 8.

No. 521a. *Note by the Chief Engineer for Irrigation.*

There appear to me to be several points connected with the embankment and protection of the Polaveram Island, near the mouth of the Godavery, which should

be determined before the Government finally decide either what should be done, or how the expense should be met.

1*st.*—It should be ascertained what works are required in order to prevent in the future the injury which the island appears to have sustained from inundation, and from the erosive action of the Godavery freshes on its banks. The District Engineer should arrange for this being done at once, and, if necessary, such temporary assistance as may be required to complete the surveys and levels without delay can be sanctioned on application. Care must be taken that the embankments are placed where they will not be liable to be undermined; and protective works to the island banks must be designed so as not to set up reflex action on the opposite banks of these branches of the Godavery.

2*ndly.*—It seems requisite that the areas of the Zemindari and Government ryotwari lands, respectively, of the island, with the revenues or peishcush therefrom derived should be distinctly stated. Nothing definite is given in Mr. Foster's letter of the 25th October last, and the information given in Mr. Stuart's letter, No. 182, 4th June 1872, G. O., Revenue Department, 17th August 1872, No. 1,212, appears to relate to only one estate, and does not give particulars for the portions on the main land and island respectively, but on this will depend, if not the decision of Government as to who is to bear the charge, at any rate the funds from which, if the Government provide for the outlay, the expenditure is to be provided for. Under all the circumstances, when these come to be fully understood, the Government may decide to carry out the works from State funds, but it by no means necessarily follows that the cost would be debitable to the Agricultural Ordinary grant.

G. O., Revenue Department, 11th December 1872, No. 1,663.

2. It may be noticed that some of the particulars noticed in Mr. Foster's letter already referred to seem to require further elucidation. Nothing appears to have been done to the embankments of the Polaveram Island since the Godavery anicut was built, and if these embankments were constructed, as Mr. Stuart thinks was the case, under a Collector, whose name is well known but not given, it may be possible to find out when they were carried out, at what cost, under what circumstances, and from what funds. It is quite possible that the Zemindari estates may have paid for them, though the Collector may have been the moving power in the matter.

3. The sketch given in paragraph 4 of Mr. Stuart's letter to Mr. Foster gives hardly a correct notion of the circumstances of the island. It may very possibly be the case that the embanking of the higher part of the Godavery has appreciably injured Polaveram, but the latter is so near the mouth of the river that, in all likelihood, the increase in the height of the freshes is but small, and the condition of its inhabitants but little, if at all, worse than in former years. The Godavery anicut has, among other things, acted as a regulator on the distribution of the freshes. I am not aware whether it has passed more, or less, water down this branch than before, but it has certainly prevented the discharge of the several branches being dependent, as much as formerly, upon the sand banks at and above Dowlaishweram.

4. If the latter part of paragraph 2 of Mr. Foster's letter be correct, there should be no difficulty in producing evidence of its correctness. The Collector of Mr. Stuart's paragraph 1, when his name and the time of his Collectorate are stated, will possibly show whether Polaveram was embanked before or since the upper parts of the delta were protected.

5. The circumstances under which the embankments, referred to in the extracts given in paragraph 4 of the Acting Collector's letter, were constructed at the public expense were, it appears to me, almost exactly the opposite to those of Polaveram; but on this point a more definite idea will be practicable when the areas of Zemindari and Government lands in the island are known. It may further be remarked that, until the deltas were intersected in all directions by artificial irrigation canals, the overflow of the river was of less consequence. For the protection of Government property embankments became necessary and were properly paid for out of public money, although, in so doing, Zemindars derived some benefit. In Polaveram the case is altogether different; it is unconnected with the anicut irrigation, and, as I have been informed, though on this point definite information from the Revenue Officers would be valuable, there is not a sufficient demand for water to warrant the expense of taking a channel across by an aqueduct from the central delta.

6. The history of the estimate of Rupees 22,000 is as follows:—On the 10th June 1871, in letter No. 103, the Collector, Mr. Fraser, wrote to the Executive Engineer, Captain Hasted, forwarding a copy of an Arzi from the Tahsildar of Amlapore "regarding certain breaches caused to the river bank at certain villages in Kesevakurroo estate," and requesting him "to order the necessary repairs to be made to them," and, in reply, Captain Hasted intimated "that partial repairs to the river bank" appeared "to be useless as the river water can turn any short bank. An estimate for Rupees 22,000 has been prepared for completing the bank on the Polaveram Island, and it is hoped that this may be put in hand another season." The Superintending Engineer very properly declined to approve of a large estimate which had been prepared without levels by a subordinate who had been sent down in connection with a supposed trifling work, and who found that a great deal must be spent if any good were to result. It is to be regretted that a reliable estimate could not have been substituted at once by the Executive Engineer, but that officer has had more than enough on his hands, and the work to be done in Polaveram was not apparently emergent, however desirable in itself. Polaveram would seem to be situated somewhat similarly to Divi in the Kistna; there to shut out flood waters entirely would be injurious, while to admit them to just the desired extent, and no more, is not an easy matter to arrange. If all Polaveram would use anicut water, floods might be shut out entirely, but probably on the average the people find, or think, they are better off without a reliable supply coupled with a water-rate.

FORT ST. GEORGE,
7th January 1873.

(Signed) J. MULLINS, Lieut.-Colonel, R.E.,
Chief Engineer for Irrigation.

No. 522. ORDER THEREON, 27th January 1873, No. 254.

IRRIGATION, No. 47.

G. O., Revenue Department, No. 1,663, of the 11th December 1872, and the Note by the Chief Engineer for Irri-

gation will be communicated to the District Engineer, Godavery, who will at once arrange to ascertain what can be done for the effectual protection of Polaveram, and at what cost, submitting plans and estimates.

2. The Board of Revenue will also be requested to obtain definite information as to the extent of Zemindari and Government interests involved; and, if possible, as to the history of the embankments, such as they are, which are to be found now on the island. The name of the Collector referred to by Mr. Stuart, and the date of his employment in the district, may possibly lead to discoveries which will be of use in enabling the Government to decide from what funds the expense of carrying out such work, as may be shown to be necessary, should be met, but the actual execution of the work need not be delayed thereby.

(Signed) C. J. SMITH, Captain, R.E.,
Officiating Under Secretary to Government.

No. 525. Read the following letter from the Officiating District Engineer, Bellary, to the Secretary to Government, Public Works Department, dated Bellary, 2nd January 1873, No. 2,166:—

I HAVE the honour to solicit the orders of Government with reference to the late Superintending Engineer's endorsement, No. 998, dated 26th August 1871, furnishing the further information called for by Government in G. O, No. 1,141, dated 29th April 1870, in connexion with the estimate for the diversion of the natural drainage near Cullamuddy, in the Bellary District.

No. 526. ORDER THEREON, 27th January 1873, No. 256.

IRRIGATION, No. 48.

UNDER the explanations furnished in the letter from the Acting Collector of Bellary, which was transmitted with the late Superintending Engineer's endorsement, No. 998, dated 26th August 1871, and with reference to G. O., No. 1,141, of the 29th April 1870, the Government sanction the estimate of Rupees 4,750 for diverting the flood-waters which now pass over and injure the lands of Cullamuddy, in the Ghooty Taluq.

2. The District Engineer is authorized to go on with the work at once, and, on his reporting the probable expenditure up to the 31st March, funds under Agricultural, Ordinary, will be appropriated.

(Signed) C. J. SMITH, Captain, R.E.,
Officiating Under Secretary to Government.

No. 536. Read the following letter from the District Engineer, Chingleput, to the Secretary to Government, Public Works Department, dated Chingleput, 9th December 1872, No. 54:—

IN reply to G. O., No. 2,494, 22nd October 1872, I have the honour to report that thus far our endeavours to procure the assistance of the villagers in the repair of their irrigation works have not answered.

2. The heads of villages who do undertake the duty appear generally to employ the Wudder class; the cultivators themselves have scarcely done anything, and there is of course no improvement in the style of work.

3. The exceedingly stormy weather that we have passed through may have discouraged the people, and I propose to continue the attempt in the hope of better success hereafter.

4. I would beg your attention on this subject to my No. 153, 13th February last, from the 2nd Division.

No. 537. ORDER THEREON, 27th January 1873, No. 262.

IRRIGATION, No. 49.

THE Government will await a further report as to the success which may attend the endeavour to get the heads of villages, and others interested in the works, to undertake the necessary repairs, which may from time to time be required. With regard to the style of work it will sometimes, if not always, be necessary that it should be laid out, at least in part, by a competent member of the department and then probably, with a little encouragement and exercise of patience, it will be practicable to get the villagers to do it well and properly.

(Signed) C. J. SMITH, Captain, R.E.,
Officiating Under Secretary to Government.

No. 614. Read the following Endorsement of the Officiating District Engineer, South Arcot, dated Cuddalore, 14th December 1872, No. 3:—

From the Executive Engineer, No. 1 Range, South Arcot, to the Officiating District Engineer, South Arcot, dated Camp at Vanoor, 11th December 1872, No. 766.

I HAVE the honour to report, for your information, the extent of damage caused to works of Communication and Irrigation in the No. 1 or Cuddalore Range by the unusually heavy rains experienced between the 20th and 28th ultimo. The fall of rain between 7 A.M. and 6 P.M. on the 22nd idem was carefully gauged by me at Cuddalore, and registered 10½ inches.

2. Considering the flooded state of the country generally, the damages hitherto reported (and I think I have now heard all there is to be heard) may be said to be very inconsiderable, and certainly not what I had anticipated.

3. *Communication.*—The road from Cuddalore to Pondicherry has been breached in places and rendered for a time impassable. A large breach in the 116th mile is the most serious. Owing to insufficient water-way through the bridge of 3 arches of 12 feet span the embankment was over-topped, which resulted in the breach; this I think saved the bridge, which is standing safe and uninjured. Two culverts of 12 feet span (one on either side of the bridge) are required in this embankment, and these should, if possible, be built next year.

4. On the Salem Frontier Road, *via* Virdachellum, two large gaps across the road on the 20th mile require to be bridged; these gaps are left open during this year as there are no funds available for the construction of the culverts which are absolutely required here. Estimates for these masonry works were submitted to the District Engineer's office with my No. 721 of 3rd instant.

5. The road from Pondicherry to Tindevanum, *via* Mylum, is very heavy and almost impassable after these rains. In many places there is not more than 1½ or 2 inches of metal on the surface of road, which, with the heavy traffic on it, is soon broken up and destroyed, and the road is now in places like a ploughed field. This road from the 87th to the 101st mile should be re-metalled next year. An estimate is under preparation, and will be submitted immediately.

6. The road from Parangany to Valdavoor is considerably breached in the 2nd, 3rd, and 4th miles. A culvert of 15 feet span on the 2nd mile across an impassable ooday is much wanted. Valdavoor is a Sayer station and the road is a very important one, though only 6 miles in length; the whole length should be gravelled. I had much difficulty in going over this road; the breaches are being closed by mile coolies as well as possible to open out traffic again.

7. *Irrigation Works.*—There are 25 tanks reported as having breached in the taluqs of Cuddalore and Villapuram; some of these tanks were under repair in the current year and incomplete, the breaches occurring in places where the bund had not been as yet touched. Those in the neighbourhood of Vanoor I have just inspected. The most serious is the breach in the Pulichapullum tank; the ryots appear to have done all in their power to close the breach by a ring bund, but without effect; there is now no water in the tank at all; the breach is due entirely to cattle being allowed to cross the bund any where and every where; in places the bund is worn down a yard or so below the top level of the original bank from this cause. There are two calingulahs (very small ones) in this tank, the surplus water evidently discharged at a depth of 4 feet or ½ foot above wing walls; the tank may have been saved if the bund had been breached somewhere between the two calingulahs which are about 30 yards apart. Especially as the subsoil here is hard and rocky within 2 feet of the surface, the closing of the breach will cost about 600 Rupees.

8. Another serious breach in the Mount Capper Lake or the Condunghe tank occurred on the night of the 28th ultimo; the closing of the breach was taken in hand on the 30th idem, the Revenue authorities giving every assistance in procuring labor. A sluice has also been carried away in this breach; it is reported that the cause of the breach is due to the bund having become much worn at this point by cattle crossing over it. The tank was quite full at the time it breached, and there is now no water at all in it. It is hoped when the breach is closed that the tank will receive a fair supply from the Trivandipuram Anicut, though its principal source of supply is surface drainage.

9. I shall probably require about Rupees 2,500 more than is allotted* for my range under the head "Repairs, Irrigation."

* Rupees 44,000.

SUBMITTED for the information of Government, in continuation of Endorsement No. 1 of the 11th instant.

2. Estimates for the works alluded to in paragraphs 4 and 5 have been forwarded to the Local Fund Board, and those for the works referred to in paragraphs 3 and 6 will be prepared and forwarded for sanction in due course.

3. Application for additional funds required under "Agricultural Repairs" will be made on receipt of report of the extent of damages caused in the Virdachellum Range.

(Signed) R. E. NORFOR,
Officiating District Engineer.

No. 615. ORDER THEREON, 30th January 1873, No. 301.

IRRIGATION, No. 50.

COMMUNICATED to the Financial Department and to the Chief Engineer for Irrigation in continuation of G. O., No. 199, dated 21st January 1873.

2. Conductor Wiffen, Sub-Engineer, 1st grade, has been detailed to relieve Mr. Norfor of charge of the range.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

Read the following papers :—

No. 644. From the Officiating Deputy Secretary to the Government of India Public Works Department, (Irrigation,) to the Chief Engineer of Irrigation Works, Madras, dated Simla, 20th September 1871, No. 519-I.

I HAVE the honour to enclose a copy of the papers noted on the margin, and to request your opinion as to the desirability of erecting gauges of the description recommended by the Chief Engineer of Irrigation in the Punjab. I think that in many localities such gauges might be desirable, and if you are of the same opinion, would request you to submit to this office an indent for the number required in the Madras Presidency.

Letter from Government of Punjab, No. 3,980-I, of the 13th September 1871, and accompaniments.

No. 38.

CIRCULAR MEMORANDUM OF THE ACTING CHIEF ENGINEER FOR IRRIGATION.

From the Chief Engineer, Irrigation Works, Punjaub, to the Inspector-General of Irrigation, Simla, dated Lahore, 13th September 1871, No. 3,980-I.

WATER gauges of some durable material have long been a *desideratum* on the irrigation works and rivers in Upper India. Attempts have been made locally to produce an article better suited than the ordinary painted rods, but only with a partial degree of success. One description made by Mr. Waston, Executive Engineer of the Madhopoor Workshops, consists of an iron bar with aised edges filled in with Plaster-of-Paris, on which glass is fastened down. The width of the

rod is about 3 inches; cost from 1 Rupee to 1 Rupee 1 Anna per running foot. The glass however, is liable to injury, and the Plaster-of-Paris to discoloration if any air gets access to it. Mr. E. C. Palmer, when Executive Engineer of the 2nd Division, Baree Doab Canal, enamelled iron bars for the purpose with some success, but the enamelling is found not to last. The cost per foot run was for bars one-fourth inch thick—

2 Inches wide	13 Annas.
3½ Do.	1 Rupee 2 Annas.

2. Enamelled iron, the manufacture of which has lately been brought to great perfection in England, appears to me to be particularly well suited to the purpose. When last in England I made inquiries from the patentees, Messrs. Willing and Co., 70, St. Martin's Lane, and found that water-gauges of this material had long been in use. One set up in the harbour of Amsterdam had been then standing for five years without showing signs of wearing or discoloration. Along the Punjaub Railway line, a number of the mile-marks are of this material, and appear to stand well.

3. Since returning to India I have had more particular inquiries made in England as to cost, the best form of the iron plate, etc.; enclosed are the replies, in original, from the patentees. Their estimate is based on a list of the total number probably required which I sent to England, as I understood that the rate would in part depend on the extent of the order.

4. In this approximate estimate of numbers and lengths the seven rivers with which we have to deal are provided for thus,—

Indus ...	2
Jhelum ...	2
Chenab ...	3
Ravee ...	3
Beeâs ...	1
Sutlej ...	4
Jumna ...	2

with a few in excess each marked up to 20 feet in length, the remainder are for the canals, inundation as well as permanent.

5. The estimate of cost of the gauges landed, say, at Lahore, is as follows :—

Total weight of enamelled gauges = 3,391·5 lbs., or about 1·51 tons.

Freight from England to Calcutta will not exceed £5 per ton.

Transit by rail to Lahore, say, Rupees 200 per ton.	£.	s.	d.
Cost in England as per Messrs. Willing and Co.'s estimate ...	238	6	6
Packing, etc....	65	0	0
	303	6	6
Freight to Calcutta 1·75 tons, including weight of package, at £5	8	15	0
	312	1	6

	RS.
Say ...	3,200
Rail to Lahore 1·75 tons, at 200 ...	350
Grand Total...	3,550

Average cost per running foot of gauge $= \frac{3,550}{3,900} =$ Rs. 0·91 = 14 As. 7 P.

So that the cost of a first rate article from England would, there is little doubt, be less than that of the very inferior ones which can be made here.

6. It was proposed to make the iron plates of "thimble" iron, but this the patentees seem to consider unnecessary. The plates will be screwed or fastened on to wooden posts or masonry walls.

7. If the proposals meet with your approval, indents in proper form will be submitted for transmission to the Secretary of State.

8. I have had these details by me for some time, but deferred sending them up until the question of the introduction of the metre system was settled. As this, however, now seems to be put off *sine die*, there is no longer any reason to delay getting gauges marked, as these were intended to be to feet and decimals.

9. Drawings of the three widths of plate proposed, full size, are annexed. All the 10 feet and over gauges the patentees recommend to be in 5 feet lengths.

The lengths and widths are as follow :—

I.—25	Gauges.	Marked up to	20 feet,	breadth of plate	0·4	feet	marking	0·3	feet.
II.—10	Do.	do.	15 ,,	do.	0·4	,,	do.	do.	
III.—40	Do.	do.	10 ,,	do.	0·4	,,	do.	do.	
IV.—80	Do.	do.	7·5 ,,	do.	0·375	,,	do.	0·25	
V.—450	Do.	do.	5 ,,	do.	0·20	,,	do.	0·15	

10. The return of the original letters is requested with reply.

London, W. C., 7th June 1870.

Sir,—In reply to yours we beg to hand you quotation for tidal gauges and hope the price will be sufficiently low to secure the favour.

Yours very obediently,
(Signed) E. WILSON.

7th June 1870.

Enamelled iron tidal gauge, blue ground white figures, each lot same figures.

	s.	d.	
25 — 20′ × 4″ × 14 W. G.	27	6	each
10 — 15′ × 4″ × 14 W. G.	10	0	,,
40 — 10′ × 4″ × 14 W. G.	15	0	,,
80 — 7½′ × 3″ × 12 W. G.	10	0	,,
450 — 5′ × 2″ × 12 W. G.	5	6	,,

The strips of wood for packing plates, brass or copper screws for fixing, and close packing cases for shipping, £65 complete.

MEMORANDUM.

London, *June 7th*, 1870.

To
J. DOYLE SMITH, Esq.,
Alveley Rectory,
Bridgenorth.

Dear Sir,—In reply to your queries, the iron need be neither raised or thimble for strength, as 12 gauge iron for narrow plates and 14 for the broader will be very strong even taking into consideration transit and contingencies. We also propose that the 10 feet plates and all exceeding should be in 5 feet lengths, which will be a great security against bending, and, as a further security, we propose putting three-fourth inch board between each pair to facilitate the carrying about.

Relative to fixing we propose plugging with lead and fixing with brass or copper screws similar to those used by the Dutch Government.

Yours obediently,
(Signed) E. WILSON,
pro. WILLING & Co.

Samples and price lists on application, price enclosed.

Enamelled Iron Depôt,
70, St. Martin's Lane,
London, W. C., *June 13th*, 1870.

Dear Sir,—The blue enamel we use as a ground is very near a black ; in fact, a few yards away it becomes black, and we should think that is the colour required. We can give you a blue

black at same cost. Relative to figures we did make the remark, but it was only to make it definite, namely, that part should not be lettering, but that the whole should be consecutive numbers and same size.

Yours obediently,

(Signed) E. WILSON,
pro. WILLING & Co.

J. D. SMITH Esq., Alveley Rectory, Bridgenorth.

WITH reference to the papers recorded above, the Acting Chief Engineer for Irrigation observes that the want of water-gauges of some durable material has been felt in this Presidency as elsewhere, and the enamelled iron gauges appear in every way to meet this want, both on account of their durability and their cheapness.

2. Superintending Engineers are requested to be good enough to state the number and length of the gauges they may require in their respective divisions, and to furnish a list of the works to which they propose to attach the gauges.

3. If in any of the divisions as durable, but cheaper gauges have been provided, the Acting Chief Engineer for Irrigation, will feel obliged if the Superintending Engineers will be good enough to furnish a brief descriptive memorandum of such gauges with a statement of their cost.

4. Tracings of portions of the gauges showing the width of plate, full size, are enclosed, and Superintending Engineers are requested to suggest any alterations or improvements which may seem to be desirable.

(Signed) R. F. OAKES, Captain, R. E.,
Acting Chief Engineer for Irrigation.

FORT ST. GEORGE,
19*th October* 1871.

No. 341.

No 645. *Note by the Chief Engineer for Irrigation.*

THE applications for enamelled iron gauges, received from the several divisions, amount collectively to upwards of 6 tons in weight. I think it will be advisable, in the first instance, to obtain a few gauges of this description on trial, and to send them to the principal Irrigation Ranges.

2. It has been suggested that the figures on these gauges are not large enough, and that the tops of the figures should coincide with the complete foot. I think the figures may with advantage be made two tenths of a foot in height, but for water gauges it is better that the centre of the figure, as in the drawings, should be on the dividing line between successive feet.

3. The annexed memorandum shows the gauges proposed to be obtained, and subjoined is an abstract and approximate estimate of cost:—

No.	2 of 35	feet length	0·4	feet width
,,	4 of 30	,,	,,	,,
,,	2 of 20	,,	,,	,,
,,	9 of 15	,,	,,	,,
,,	12 of 10	,,	,,	,,
,,	14 of 8	,,	0·375	,,
,,	5 of 5	,,	,,	,,

Estimate.

485 feet of 0·4 feet width	at s. 1-4	£ 32	6	8
137 ,, of 0·375 ,,	at s. 1-3	£ 8	11	3
		£ 40	17	11

Weight.

485 feet at 1·1 lbs. per foot. ...	533	5
137 ,, at 1·09 ,, ,, ...	149	3
	682	8

Say, with packing case, ⅓rd of a ton.
Total cost at Madras about £ 45.

FORT ST. GEORGE, (Signed) J. MULLINS, Lieut.-Colonel, R.E.,
31st December 1872. *Chief Engineer for Irrigation.*

No. 646. ORDER THEREON, 31st January 1873, No. 317.

IRRIGATION, No. 51.

ORDERED that the following letter be sent.

(Signed) C. J. SMITH, Captain, R.E.,
Officiating Under-Secretary to Government.

No. 647. From the Secretary to the Government of Fort St. George, Public Works Department, to the Secretary to the Government of India, P.W.D., dated 31st January 1873, No. 318.

IRRIGATION, No. 52.

SIR,—In reply to the Officiating Deputy Secretary's letter, No. 519-I, dated 20th September 1871, I am directed to state that, as an experimental measure, the Irrigation Department in this Presidency will be glad to receive the following enamelled iron gauges:—

2 of 35 feet width 0·4 feet.
4 ,, 30 ,, ,, ,, ,,
9 ,, 15 ,, ,, ,, ,,
12 ,, 10 ,, ,, ,, ,,
14 ,, 8 ,, ,, 0·375
5 ,, 5 ,, ,, ,, ,,

No. 650. Read the following letter from the Chief Engineer for Irrigation, to the Secretary to Government, Public Works Department, dated Fort St. George, 17th January 1873, No. 75:—

1 Register.
1 Bill.

I HAVE the honour to forward, herewith, a Register of lands taken up by the Madras Irrigation and Canal Company in the Kurnool District under Class A. during the month of August 1872, together with a bill, amounting to Rupees 216-1-6, for compensation to be paid

thereon, and to request that you will be good enough to obtain the sanction of Government to the same.

No. 651. ORDER THEREON, 31st January 1873, No. 320.

IRRIGATION, No. 53.

SANCTIONED.

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.